(26,528)

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1918.

No. 456.

MATTHEW T. CHAPMAN AND MARK C. CHAPMAN, PETITIONERS,

vs.

JOHN A. WINTROATH.

ON WRIT OF CERTIORARI TO THE COURT OF APPEALS OF THE DISTRICT OF COLUMBIA.

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Court of Appeals of the District of Columbia, October Term, 1917.

Patent Appeal Docket, No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

Appeal from the Commissioner of Patents.

(Interference No. 39,684.)

Filed July 30, 1917. Printed August 29, 1917.
Office Supreme Court, U. S. Filed May 21, 1918. James D. Maher, clerk.

1 Court of Appeals of the District of Columbia.

Patent Appeal Docket, No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

In re Interference No. 39,684.

Patent Appeal Docket, No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

To the Court of Appeals of the District of Columbia:

Your petitioner, John A. Wintroath, of Los Angeles, California, respectfully represents:

That he is the original and first inventor of certain new and useful improvements in Well Mechanism.

That on November 25th, 1913, in the manner prescribed by law, patent #1,079,679 was issued to him by the Commissioner of Patents for the said invention.

That thereafter, to wit, on the 21st day of March, 1916, an interference proceeding was instituted and declared between his said pat-

tent and a pending application of Chapman and Chapman, serial number 38,254, filed July 6th, 1915, for a similar invention.

That the subject matter of said interference as set forth in the official declaration was as follows:

1. In a deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft driven from above and extending downward to said impeller, said power shaft being adapted to transmit power to said impeller, a fluid operated bearing located substantially at the top of said power shaft for supporting said shaft and impeller on a fluid surface, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, and auxiliary bearing means for sustaining any resultant downward thrust of said power shaft.

2 2. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a long downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said long shaft, auxiliary bearing means for sustaining any resultant downward thrust on said shaft, said fluid operated bearing and said auxiliary bearing means both being located substantially at the top of said power shaft so that the long shaft depends therefrom and by its own weight tends to draw itself into a substantially straight vertical line, and means for supplying the fluid under pressure to said fluid bearing independently of the action of the pump means.

3. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, auxiliary bearing means for sustaining any resultant downward thrust of said power shaft and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft.

That thereafter, to wit, on the 8th day of July, 1916, the case having been submitted upon the preliminary statements, on motion by this petitioner for judgment, the Examiner of Interferences rendered a decision awarding priority of invention to your petitioner.

That pursuant to the statutes and the rules of practice in the Patent Office in such case made and provided, Chapman and Chapman appealed from the said adverse decision of the Examiner of Interferences to the Board of Examiners-in-Chief, and the case having been argued and submitted to said board, a decision was rendered by said board on the 18th day of November, 1916, affirming the decision of the Examiner of Interferences.

That thereafter, pursuant to said statutes and rules, Chapman and Chapman appealed from the said adverse decision of the Board of Examiners-in-Chief to the Commissioner of Patents, and the same coming on to be heard and having been argued and submitted, a decision was, on the 18th day of June, 1917, rendered by the Commissioner adverse to your petitioner, reversing the decision of the Board of Examiners-in-Chief and awarding priority of invention to the said Chapman and Chapman.

That on the 5th day of July, 1917, your petitioner, pursuant to sections 4912 and 4913, Revised Statutes, United States, gave notice to the Commissioner of Patents of his appeal to this honorable court from his decision awarding priority of invention to said Chapman and Chapman, as aforesaid, and filed with him, in writing, the following reasons of appeal:

3 1. The Commissioner erred in awarding priority to Chapman and Chapman.

2. The Commissioner erred in holding that the question of diligence by Chapman and Chapman in making the claims in issue should be decided by analogy to Rev. Stat. Sec. 4883 rather than to Sec. 4894.

That the Commissioner of Patents has furnished a certified transcript of the record and proceedings relating to said interference case, which transcript is about to be filed by the Patent Office with the clerk of this court.

Wherefore your petitioner prays that his said appeal may be heard upon and for the reasons assigned therefor to the Commissioner, as aforesaid, and that said appeal may be determined and the decision of the Commissioner be revised and reversed, that justice may be done in the premises.

JOHN A. WINTROATH,
By SYNNESTVEDT & BRADLEY,
His Attorneys.

PAUL SYNNESTVEDT,
Solicitor and of Counsel.

Dated July 28th, 1917.

Check for the docket fee of $15.00 is hereby attached.

[Endorsed:] John A. Wintroath, Appellant, vs. Matthew T. Chapman and Mark C. Chapman. Interference # 39,684. "Well Mechanism." Petition for Appeal. Paul Synnestvedt, 1201 Chestnut Street, Philadelphia, Pa., Solicitor for Wintroath.

2–390.

UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the Records of this office of the Record for the Court of Appeals of the District of

Columbia in the matter of Interference Number 39,684, Wintroath vs. Chapman and Chapman, Subject-Matter:—Deep Well Pumps.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed at tht City of Washington, this 27th day of July, in the year of our Lord one thousand nine hundred and seventeen and of the Independence of the United States of America the one hundred and forty-second.

[Seal Patent Office, United States of America.]

F. W. H. CLAY.
Acting Commissioner of Patents.

4 Mail Room,
Dec. 2, 1912,
U. S. Patent Office.

Division 9,
Dec. 4, 1912,
U. S. Patent Office.

734,649, Paper No. 1.

Petition and Power of Attorney.

To the Hon. Commissioner of Patents:

Your petitioner *John A. Wintroath, whose Post-Office address is 900, 910 Santa Fe Ave., Los Angeles, Cal., a* citizen of *the United States* residing at *Los Angeles* in the County of *Los Angeles* and State of California, prays that letters patent may be granted to *him* for the [improvements in]* *Well Mechanism* set forth in the annexed specification, and he hereby appoints [the firm of Townsend Bros., the individual members of which firm are]* James R. Townsend [and Francis M. Townsend]* of Los Angeles, California *his* attorney [s]* with full power of substitution and revocation to prosecute this application, to make alterations and amendments therein, to receive the patent and to transact all business in the Patent Office connected therewith.

JOHN A. WINTROATH.

Specification.

To all whom it may concern:
Be it known that

I, John A. Wintroath, a citizen of the United States, residing at Los Angeles, in the County of Los Angeles, and State of California,
have invented new and useful Well Mechanism, of which the following is a specification.

5 In pumping wells used for withdrawing water or other liquids from the earth a casing is sunk, often several hundred feet into

[*Words and figures enclosed in brackets erased in copy.]

the earth, and at the bottom of said casing a rotary pumping means
is installed for raising the water or other liquid to the surface.
A long power shaft, driven from above, extends down through the
casing and transmits power to the rotary pumping means below. The
means for supporting said rotary pump and the long power shaft involves considerable inconvenience.

In some pumping systems the rotary pumping parts and power

partly
Per C. shaft are ^ supported from below by means of a delicate hydraulic
bearing located at the bottom of the casing, and said hydraulic bearing is operated by the same water pumped through the well. This construction, however, is subject to the following inherent defects:

The bearing, being operated by well water, which obviously carries some sand and grit from its origin, soon rusts and wears, and its operation becomes quite unsatisfactory.

Also said delicate hydraulic bearing, being located at the bottom of the well casing, is practically inaccessible; and due to the frequent repairs required on same, its up-keep involves considerable annual expense.

Also the long heavy power-transmitting shaft tends to bend or buckle when supported from below, and this tendency materially
Insert C'. impairs its power-transmitting capacity. ^ C'
Insert A'. A'.>

Sub. A².

My invention relates to a novel combination of pumping elements and includes novelly constructed and novelly positioned bearing means for the pumping elements, said bearing means being
accessably located above said pumping elements, and whereby the
aforesaid inherent defects of other bearing means are obviated.

[Matter enclosed between rules erased in copy.]

An object of the bearing means embraced in my invention is to reduce the friction created by supporting the rotary pumping parts and the vertical power shaft. To this end I provide the novel fluid operated bearing hereinafter described.

Another object is to provide durable and efficient bearing means for supporting the vertical power shaft and the rotary pumping parts, which bearing shall be easily and conveniently accessible at the surface of the earth. To this end I provide above near
Per C. the pit casing, and [at]* the upper extremity of the power transmitting shaft, a novelly constructed bearing which may be readily dismantled for inspection and repairs. As will be hereinafter 6
described the vertical power shaft and the rotary pumping means are suspended from the bearing, and the buckling and weakening
Insert D'. tendency of said power shaft is thereby obviated. D'

Another object is to avoid excessive wearing and rusting of the bearing parts and at the same time to efficiently lubricate the same. To this end I use lubricating oil under pressure for operating the novel fluid bearing hereinafter described.

Other objects may appear from the following detail description taken in connection with the drawings.

The following drawings illustrate my invention.

Figure 1 is an elevation partly in axial section through the bearing embraced in my invention and shows the same attached to the upper end of the pit casing. The axial section is taken through the whole bearing casing, but only through the left half of the bearing core while the right half of said bearing core is shown in full.

Fig. 2 is a plan section taken on line x^2-x^2, Fig. 1. The left half of the roller casing has been removed in order to expose the position of the roller beneath.

Fig. 3 is a plan section on line x^3-x^3, Fig. 1.

Fig. 4 is an end view of one segment of a split collar used in my bearing.

Fig. 5 is a plan view of the split collar shown in Fig. 4.

Fig. 6 is a fragmental plan view of a balancing plate, wear plate, and packing ring used in my bearing.

Fig. 7 is an axial section of the same parts shown in Fig. 6.

Fig. 8 is a fragmental view illustrating the well mechanism in place and broadly shows the novel combination of parts embracing my invention.

Fig. 9 is a plan view of one of the bearing castings.

Into the earth 1 is sunk a cylindrical drum 2 shown in Fig. 8

[*Words and figures enclosed in brackets erased in copy.]

and termed a pit casing. At the lower extremity of pit casing 2 the coupling member 3 connects said pit casing to a well casing 4,
said well casing having a lower screened and perforated portion 5;
and at the upper extremity of said pit casing the flange plate 6 connects said pit casing to a discharge Y 7. The well casing 4 projects down into the water bearing sands and gravels and is adapted to form a well reservoir from which the rotary pumping 7
means 8, located in pit casing 2, and usually near the bottom thereof, may draw its water supply.

The pumping means 8 comprises a stationary pumping casing 9

Insert C^2. and rotary impeller 10 [.]* $\wedge$ C^2

At its lower end the pump casing 9 is connected with a suction pipe 11 extending into the well casing 4 and being adapted to con-
duct water up to the pump casing; and at its upper end said pump
casing is connected to a water conduit 12, the latter serving to conduct the pumped water up to the discharge Y 7. This water conduit 12 is rigidly connected to the discharge Y above, and in an obvious manner serves to support the pump casing 9 and the suction pipe 11 in their operative positions.

may be connected in any suitable manner to the long power shaft 13

Per D. The impeller or rotary pumping parts 10 $\wedge$ [are rigidly connected
to and supported by a vertical power shaft 13]* which extends down
through the pit casing 2 and which is driven from above by means
of a pulley 14. A small pipe 15 is supported as hereinafter described
surrounds power shaft 13 and is adapted to contain an oil bath
wherein said power shaft runs. The weight of the impeller and of
long novelly
" " the $\wedge$ power shaft are $\wedge$ supported and suspended at the surface of the
earth in a novelly constructed and novelly positioned fluid operated bearing 16, the details of which will be described below.

When the power shaft 13 is driven the pump impeller 10 will rotate and by means of the suction pipe 11 water will be drawn from the well casing 4 into the pump casing 9. On continued driving of shaft 13 the rotary impeller 10 will force this water

[* Words and figures enclosed in brackets erased in copy.]

up through the conduit 12 and discharge it through the discharge Y

Per D. 7. It will be understood that part of the weight or downward re-action of the water in conduit 12 is sustained on the impeller 10, and must be added to the weights of said impeller and power shaft 13 in considering the total weight supported above in bearing 16.

The details of this bearing will now be described.

The upper face of the discharge Y 7, Fig. 1, is formed with two offset seats 17 and 18 joined by the shoulder 19, and by means of bolts 20 the similarly but conversely formed face 21 of the casting 22 is securely attached to the discharge Y.

From the lower face of casting 22 depends a cylindrical portion 23 which loosely surrounds the power shaft 13 and forms about same the packing chamber 24 containing the packing 25. The usual packing gland 26 extends into the packing chamber 24 and is secured to and adjusted on casting 22 by means of bolts 27. The lower extremity of the depending cylindrical portion 23 is provided with threads 28 upon which is secured a similarly threaded coupling 29. The upper extremity of oil-containing pipe 15 is seen to be similarly threaded also, Fig. 1, and by screwing same into coupling 29 a complete and adequate support for said pipe is provided. The casting 22 terminates above in a flange 30, from the lower face of which depends another cylindrical portion 31 which embraces power shaft 13 so as to form another packing chamber 32 containing packing 33. The usual packing gland 34 extends into chamber 32 and is secured to and adjusted on cylindrical portion 31 by means of bolts 35. In order that the aforesaid packing glands and bolts may be accessible for inspection and adjustment two hand holes 36 are provided in opposite sides of the casting 22.

The flange 30 is thickened at one side so as to provide sufficient metal through which the horizontal fluid conduit 37 may pass.

At its outer extremity said conduit is provided with threads 38 and at its inner extremity said conduit joins the vertical conduit 39, the latter extending up through a cylindrical projection 40, Figs. 1 and 9, which rises from flange 30. The periphery of

the projection 40 is threaded as at 41 and a similarly threaded wear plate 42 is screwed upon same. A screw 43 locks wear plate 42 to projection 40 and an ordinary ring slot 44, Fig. 7, permits a packing ring 45 to be sprung around the periphery of wear plate 42.

Above projection 40 and wear plate 42, and spaced apart from same, is positioned a balancing plate 46 having a depending mach-

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ined rim 47 which co-operates with the packing ring 45, with wear plate 42, and with projection 40, to form the substantially fluid tight chamber 48.

The balancing plate 46 rotates with the power shaft 13 and is firmly and rigidly attached to same by means of keys 49 lying in key slots 50 and 51 in the power shaft and balancing plate respectively and fitting snugly between the slot shoulders 50′ and 50″ in the shaft. The keys 49 extend above the balancing plate so that they may be readily withdrawn from slots 51. With this construction it becomes necessary, however, to bind the upper portions of said keys tight into the slots 50 of shaft 13; and for this purpose I provide a split collar comprising two removable segments 52 and 53 best shown in Fig. 3. The segments of this split collar embrace the keys 49 and when in position serve to bind them tightly into the aforesaid slots. The periphery of the segments 52 and 53 is provided with screw-threads 54, Figs. 4 and 5, and a similarly threaded annular collar 55 is screwed onto segments 52 and 53 and serves to rigidly hold them in position. The set screw 56 is also provided and sets the collar 55 firmly onto segment 52. By this construction balancing plate 46 may be easily and rapidly disconnected from the power shaft 13, and is also rigidly connected with said shaft in such manner that all the weight carried by the shaft may be imparted to and sustained by the balancing plate 46.

It will be seen that the fluid tight chamber 48 is bounded above by the balancing plate 46 and is connected below through conduit 37, pipe 57, safety valve 58 and pipe 59 to the fluid pump 60. This pump is of any preferred construction and is shown to be driven by an electric motor 61. An oil-containing reservoir or sump 62 is located beneath safety valve 58 and a suction pipe 63 extends into the oil in said sump and is adapted to conduct same to the fluid pump 60.

When motor 61 drives pump 60, oil from the sump 62 will be forced under high pressure through pipe 59 into the fluid tight chamber 48 where its pressure will act upwardly on balancing plate

46. If the fluid pressure in said chamber is correctly chosen its upward effort on the balancing plate 46 will balance all the weight of shaft 13 and the parts supported by same. In this condition the power shaft is said to float, and its weight will be suspended from or supported on the upper surface of the fluid in chamber 48. As the shaft rotates in this floating condition the supporting friction of same will be slight and will include only the resistance between the supporting fluid surface and the balancing plate 46, and between the packing ring 45 and the ring slot 44. The shaft 13 often runs approximately at 1,000 revolutions per minute and supports a total weight of

Per C. 2,000 pounds or more; and I have found that under these conditions suspension from a fluid surface is essential if durability and efficiency are to be attained.

Per D. It might seem to be a preferred mode of operation to have the shaft [is preferred that the shaft be]* always suspended in a floating condition, but in practice several effects conspire and make constant floating difficult. The fluid pressure in chamber 48 is sometimes either superfluous or deficient, so that a summation of shaft forces, including the fluid pressure on the balancing plate, the shaft weight, the impeller weight and the water weight will leave a resultant upward or downward force of the shaft. Safety valve 58 is of ordinary conventional construction and tends to prevent any surplus fluid pressure on the balancing plate 46, the safety valve operating to release a portion of the fluid acting on the balancing plate and thereby eradicating the surplus pressure referred to. The fluid released by the safety valve will drop into the oil sump beneath, thereby preventing any waste of same. As a safeguard, however, against failure of the safety valve 58 I provide auxiliary bearing means adapted to sustain any resultant upward force of the shaft, said upward force being occasioned by surplus fluid pressure on the balancing plate 46.

This auxiliary bearing means is located directly above collar 55 and comprises the following parts: A circular ball race 64′ is cut in the upper surface of collar 55, and a series of hard steel anti-friction balls 65 are adopted to run in the same. Above said balls, and spaced apart from same, is another ball race 66 cut in a wear plate 67. Wear plate 67 is attached by screws

[* Words and figures enclosed in brackets erased in copy.]

68 to a neck 69 depending from a casting generally referred to as
70, the said casting being rigidly secured at its lower end to casting 22 by means of bolts 71.

By providing this auxiliary bearing means the objection to superfluous fluid pressure in chamber 48 is overcome, because the
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resultant upward shaft force will be adequately sustained by the anti-friction balls 65 and wear plate 67.

The upper face of flange 30 is formed with two offset seats 72 and 73 joined by the vertical shoulder 74, and the lower face of flange 75, of casting 70, is formed with both similar but conversely offset seats. The offset seats 17 and 18 on the discharge Y 7 and casting 22, and also the offset seats 72 and 73 of the castings 22 and 70, serve to maintain the discharge Y and the
castings 22 and 70 in perfect alinement, and additionally serve to provide fluid tight joint between said elements. Above flange 75 the casting 70 is built with a cylindrical portion 76 which forms a second chamber 77 surrounding and including both
the fluid tight chamber 48 and the auxiliary bearing means above
referred to.

Under normal operation fluid will slowly leak from the chamber 48 past the packing ring 45 into the chamber 77. There being
no escape for this fluid from the lower part of chamber 77 the same will gradually fill said chamber until the whole of the balancing plate and also the balls 65 of the auxiliary means will be immersed. An overflow pipe 78 taps chamber 77 above the auxiliary
bearing means and serves to conduct the fluid from chamber 77 back
to sump 62 when said fluid rises above the level of said overflow pipe. For purposes of clearness, however, the operating fluid has been omitted from chamber 77.

By choosing clean oil as the fluid for operating my bearing, no sand or grit will be injected between the active parts and a good wearing capacity will be thereby procured. Also there will be no rusting tendency of the bearing parts and the delays and danger introduced by rusted metal will be avoided. Also the whole
of the fluid bearing and the auxiliary bearing means being immersed in the oil, an efficient and adequate lubrication will always exist at every friction point. Also by providing overflow pipe 78 no oil is wasted and economy of operation is a prominent
feature in my installation.

As a safeguard against pressure deficiency of the fluid in chamber 48 I provide a second auxiliary bearing means located within the cylindrical portion 79 of casting 70. A web 80 extends across casting 70 between the cylindrical portions 76 and 79 and from said web rises a boss 80'. An enlarged aperture 81 is provided in said boss and permits power shaft 13 to pass through same, the said aperture being flared into an upper concave seat 82. Into aperture 81 and concave seat 82 fits an appropriately shaped casting 83 the same having a projecting drum 84 and a central aperture 85, the latter being adapted to loosely embrace power shaft 13. A circular disk casting 86 is formed with an inclined wheel race 88 extending in a circle completely around said casting. From the bottom of casting 86 depend two lugs 89 positioned so as to interfere with corresponding lugs 90 rising from web 80 of casting 86. The lugs 89 and 90 co-operate to arrest and prevent rotation of casting 86 and casting 83 around shaft 13. A cast annular frame 91 carries three inclined anti-friction wheels 92, Figs. 1 and 2, said anti-friction wheels being journaled to the frame by means of pins 93, and said wheels being adapted to run in the wheel race 88. The cast frame 91 is provided with an aperture 94 and within said aperture is positioned a casting 95 having a lower inclined face 96 adapted to rest and roll upon the inclined anti-friction wheels 92. The power shaft 13 is threaded above at 97, and a similarly threaded collar 98 is screwed rigidly onto the same. The pin 99 projects into the collar 98 and into the casting 95 and rotatively binds same, so that when collar 98 is screwed home, casting 95 and shaft 13 are bound to each other.

When there is a pressure deficiency on balancing plate 46 a resultant downward force exists on power shaft 13. This force is transmitted to casting 95 and from same is passed to and sustained on the auxiliary bearing means comprising anti-friction wheels 92 and cast ring 95. As shaft 13 and casting 95 rotate the wheels 92 will roll around the wheel race 88 and due to the relative radial distances of inclined face 96, and inclined wheel race 88 from the center of shaft 13, the cast frame 91 will rotate at a slow speed compared with that of the shaft 13 or casting 95. By this construction the friction necessary to support the rotating shaft is negligible, despite the resultant downward force of same.

At the upper extremity, shaft 13 is provided with a belt pulley 14 rigidly mounted on the shaft by any suitable means such as the square thread 100, and power is imparted to same by any ordinary belt as will be readily understood.

13

Insert D². D².>

In starting the well mechanism embracing this invention the pumping means 60 is brought into operation to raise the oil pressure in chamber 48 until the vertical weights or forces on shaft 13 are balanced and said shaft floats on the oil surface. Power is then imparted to pulley 14 and is transmitted by shaft 13 to the impeller 10 which effects the pumping and discharging of the water through discharge Y 7. If for any reason a surplus or deficient oil pressure exists on the balancing plate, the auxiliary bearing means located either within the cylindrical portion 76 or the cylindrical portion 79, of casting 70, will operate to sustain the resultant force of the shaft.

Insert B². B².>

If at any time the bearing is to be dismantled for repairs the bolts 71 and the pulley 14 are removed, so that the casting 70 may be raised off casting 22 to display the bearing elements beneath. The bearing being located at the surface of the earth is readily accessible for this purpose and together with the rapidity by which same may be dismantled, a substantial advance in the art is effected.

Furthermore, it is a well-known fact that the power-transmitting capacity of shafts under compression is less than the power-transmitting capacity of shafts under tension. By supporting or suspending the heavy power shaft and pumping impeller from above, and thereby operating said shaft under tension, my invention permits a more complete utilization of the power-transmitting capacity of shaft 13 than is possible in the constructions where the shaft and pumping impeller are supported from below. Also, with this arrangement all buckling and bending tendency of the shaft 13, along with its consequent vibratory and rattling tendency are obviated.

Per D.

Insert D³. D³.>

From the foregoing detailed description the construction and

mode of operation and co-operation of my novel bearing, pumping
20 means and other elements are thought to be clear.

14 I claim:—

Sub. A[a].

---

1. In combination, pumping means located beneath the surface of the earth; a power shaft driven from above and extending down to said pumping means, said shaft being adapted to transmit power to said pumping means; and a fluid operated bearing located above said pumping means for rotatively supporting said power driven shaft on a fluid surface.

2. In combination, a casing; pumping means located in said casing; a power shaft driven from above and extending down into said casing, said shaft being adapted to transmit power to said pumping means; and a fluid operated bearing located above said pumping means for rotatively supporting said power-driven shaft on a fluid surface.

3. In combination, a casing; pumping means located in said casing, said pumping means comprising a pump casing and a rotary pump impeller; a power shaft driven from above and extending down into said casing, said power shaft being rotatively connected below to said rotary impeller; and a fluid-operated bearing located above said pumping means and adapted to rotatively support said power shaft and said rotary impeller on a fluid surface.

4. In combination, a casing; pumping means located in said casing; a power shaft driven from above and extending down into the casing, said shaft being adapted to transmit power to said pumping means; a balancing plate located on said shaft above said pumping means; a substantially fluid tight chamber below said balancing plate, said fluid tight chamber being bounded above by said balancing plate; and means for forcing a fluid under pressure into said substantially fluid tight chamber.

5. In combination, a casing; pumping means located in said casing; a power shaft driven from above and extending down into the casing, said power shaft being adapted to transmit power to said pumping means; a balancing plate located on said shaft above said pumping means; a substantially fluid tight chamber below said balancing plate, said fluid tight chamber being bounded above by said balancing plate; means for forcing a fluid under pressure into said substantially fluid tight chamber; and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft which thrust may be caused by a surplus fluid pressure on said balancing plate.

6. In combination, a casing; pumping means located in said casing; a power shaft driven from above and extending down into the casing, said power shaft being adapted to transmit power to said pumping means; a balancing plate located on said shaft above said

pumping means; a substantially fluid tight chamber below said balancing plate, said substantially fluid tight chamber being bounded above by said balancing plate; means for forcing a fluid under pressure into said fluid tight chamber; and auxiliary bearing means for sustaining a resultant downward thrust of said power shaft, said downward thrust being occasioned by a deficiency in the fluid pressure on said balancing plate.

7. In combination, a casing; pumping means located near the bottom of said pit casing; a vertical power shaft driven from above and extending down into the casing, said power shaft being adapted to transmit power to said pumping means; a balancing plate located on said shaft adjacent its upper end; a substantially fluid tight chamber formed below said balancing plate, said fluid tight chamber being bounded above by said balancing plate; means for forcing a fluid under pressure into said substantially fluid tight chamber; auxiliary bearing means for sustaining a resultant upward thrust of said shaft, said upward thrust being caused by a surplus fluid pressure on said balancing plate; and second auxiliary bearing means for sustaining a resultant downward thrust of said shaft, said downward thrust being occasioned by a deficiency in the fluid pressure on said balancing plate.

8. In combination, a casing; pumping means located in said casing; a power shaft driven from above and extending down into the casing, said power shaft being adapted to transmit power to said pumping means; a balancing plate located on said shaft above said pumping means; a substantially fluid tight chamber below said balancing plate, said fluid tight chamber being bounded above by said balancing plate; means for forcing a fluid under pressure into said substantially fluid tight chamber; and means tending to prevent surplus fluid pressure on said balancing plate.

9. In combination, a casing; pumping means located in said casing; a power shaft driven from above and extending down into the casing, said power shaft being adapted to transmit power to said pumping means; a balancing plate located on said shaft above said pumping means; a substantially fluid tight chamber below said balancing plate, said fluid tight chamber being bounded above by said balancing plate; means for forcing a fluid under pressure into said substantially fluid tight chamber; means tending to prevent a surplus fluid pressure on said balancing plate, and auxiliary bearing means for sustaining a resultant upward thrust of said shaft, said upward thrust being occasioned by a surplus fluid pressure on said balancing plate.

10. In combination, a casing; pumping means in said casing; a power shaft driven from above and extending down into the casing; said power shaft being adapted to transmit power to said pumping means; a balancing plate located on said shaft above said pumping means; a substantially fluid tight chamber below said balancing plate, said fluid tight chamber being bounded above by said balancing plate; means for forcing a fluid under pressure into said substantially fluid tight chamber; means tending to prevent a surplus

18 Mail Room,
Jun- 9, 1913,
U. S. Patent Office.

Division 9,
Jun- 10, 1913,
U. S. Patent Office.

Paper No. 4.

In the United States Patent Office.

Div. 9, Room 142.

Paper No. 3.

A.

John A. Wintroath. Well Mechanism. Filed Dec. 2, 1912. Serial No. 734,649.

Los Angeles, Cal., May 14, 1913.

Commissioner of Patents.

Sir: In response to Office action of Apr. 3, 1913,—
Please amend this case as follows:—

Page 1, line 27, after "capacity," insert:
Insert C'. C'.>

A'. —According to the very principle of those fluid bearings which derive their fluid pressure from the main well pump itself, those bearings must necessarily submit to the above defects. Such a bearing must be located down reasonably close to the pump itself. If it were located anywhere near the top of the power shaft the liquid from the well pump would have practically no pressure head at the level of the bearing, and from a practical standpoint would therefore be incapable of producing an upward reaction sufficiently adequate to support or float a long suspended shaft and impeller. Such bearings must therefore be located at some point down on the shaft and access to them is consequently difficult. The higher up such bearings are placed the more cumbersome and large must be their construction, because they must support a definite weight and at higher levels have less fluid head with which to do it; while when such bearings are placed lower down and close to the well pump they become very inaccessible, and the rattling and buckling tendency of that portion of the shaft above the bearings becomes pronounced and detrimental. Putting such a bearing down close to the pump, however, sometimes makes it possible to use a reasonably small and convenient bearing.
A'. and in practice this position is therefore the most practical despite the difficulty of access.—

19 Page 2, cancel lines 1 to 5, inclusive, and substitute the following:—

A[2]. —My invention relates to a novel combination to be used in deep well pumping mechanisms.

Per B.

The centrifugal pumps in such deep wells may be located below the surface of the earth at any distance ranging from about 20 to 50 feet as an upper limit, and from about 300 or 400 feet and more as a lower limit.

[Matter enclosed between rules erased in copy.]

The invention includes a novelly-constructed fluid operated bearing novelly located at the top of the long power shaft which extends down to and operates the pump. The relatively high fluid pressure is supplied to this novelly-positioned bearing, from some source separate from the main well pump itself, and on this account it is possible to locate the bearing practically at the top of the shaft and immediately at or reasonably near to the surface of the earth. This position makes it perfectly accessible to repairs and makes it possible to suspend practically the whole length of the shaft. All rattling and buckling of the shaft is thereby eliminated and the installation runs smoothly and practically without vibration.—

Cancel all the claims and substitute the following:

Sub. C[6].

A[3]. —1. In deep well pumping mechanism, the combination of fluid pumping means located beneath the surface of the earth, a long power shaft driven from above and extending substantially down to said pumping means, said long shaft being adapted to transmit power to said pumping means, a fluid-operated bearing located substantially at the top of said long power shaft and adapted to rotatively support said shaft on a fluid surface, and a fluid pressure source separate from said fluid pumping means for maintaining a high fluid pressure in said fluid operated bearing near the top of the shaft.

[Matter enclosed between rules erased in copy.]

20 Per C.

A[3]. 2. In deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a pump-

ing impeller in said casing, a long power shaft driven from above and extending substantially down to said pumping impeller, said shaft being adapted to transmit power to said pump impeller, a fluid operated bearing located substantially at the top of said long power shaft, said bearing being adapted to rotatively support said long power shaft on a fluid surface, and a second power driven fluid pump for producing a high fluid pressure in said fluid-operated bearing near the top of the shaft.

3. In deep well pumping mechanism, the combination of a fluid pump located beneath the surface of the earth, said fluid pump comprising a pump casing and a pumping impeller in said casing, a long power shaft driven from above and extending substantially down to said pumping impeller, said shaft being adapted to transmit power to said pumping impeller, a fluid-operated bearing located substantially at the top of said long power shaft, said bearing being adapted to rotatively support said long power shaft on a fluid surface, and positively operated means separate from and in addition to said fluid pump, for producing relatively high fluid pressure in said fluid-operated bearing near the top of the shaft.

[Matter enclosed between rules erased in copy.]

Sub. B'.

A³. 4. In deep well pumping mechanism, the combination of a casing for a fluid pump, a rotary impeller in said casing, a long power shaft driven from above and extending down to said impeller, said power shaft being adapted to support and to transmit power to said impeller, a balancing plate located substantially at the top of said long shaft, a substantially fluid-tight chamber below said balancing plate, said substantially fluid-tight chamber being bounded above substantially by said balancing plate, means separate from and in addition to said fluid pump, for forcing fluid under pressure into said fluid-tight chamber so as to normally support said long power shaft and impeller on a fluid surface, and auxiliary bearing means for sustaining a resultant downward thrust of said power shaft, said downward thrust being occasioned by any deficiency in the fluid pressure on said balancing plate.—

[Matter enclosed between rules erased in copy.]

21 The references cited have been very carefully examined and the foregoing amendments and claims serve to particularly distinguish applicant's novelty over the same.

The Price construction is of the very type from which the ap-

plicant has broken away—see page 1, lines 13 to 27, together with the above amendment of applicant's specification.

Price's supporting piston G is operated by fluid pressure coming directly from the main well pump itself. As now pointed out in the applicant's specification this practically limits piston G to a position reasonably close to the pump itself. The well pumps usually run so as merely to deliver a good flow of water at the surface of the earth, and the pressure head of the water near the surface of the earth is practically negligible as compared with the pressure head at points closer to the pump. On this account, practical considerations would make it altogether impossible for Price's supporting piston G to be located *substantially at the top of the power shaft*. Furthermore, the piston G would have to be located at some point well down along the power shaft before the pressure head would become sufficiently great to make Price's construction practical. With relatively low pressure head the piston area would have to be so tremendous as to make the construction altogether useless and impractical. Concerning the kinds of fluid-supporting bearings, therefore, of which Price's construction may be considered a good example, the conclusion is obvious that the bearing must be down at some relatively inaccessible point, and that the shaft portions above the bearing tend to buckle radially and vibrate in the course of operation.

The applicant, by his invention, however, has broken away from the foregoing defects and has made it possible to locate the fluid-operated bearing substantially at the top of the power shaft where it is perfectly accessible for repair. This, together with the possibility of suspending the whole shaft and impeller on a fluid surface, makes it possible to sink the pump to depths considerably greater than what was heretofore practicable. His long suspended shaft is substantially free from all buckling, rattling and vibrating tendency, and this greatly prolongs the useful life of the lateral bearings which support the long shaft at various points along its length. In general, the applicant's invention makes it practicable to sink wells deeper, and at the same time it greatly increases the life of the operating parts, while the expense of repairs and substitution is remarkably decreased.

This advance was accomplished when the applicant deliberately provided a second source of fluid pressure separate from the main well pump, and thereby made it possible to locate his fluid-operated bearing substantially at the top of the long power shaft. By having a separate source of fluid pressure, the pressure may be deliberately controlled so as to perfectly balance the shaft weight and the pressure may be raised to a very great value, so that the bearing itself may be of small and gainly proportions. If water is used for creating a fluid pressure in the bearing, the water may, if necessary, be strained of all its sand, or else clean oil may be used for operating the bearing. These features of operation are incidental bene-
22 fits, added to the applicant's construction over and above the prominent fact that the bearing is accessibly located, and that the long pump shaft is suspended so as to be free of vibration.

The claims are now directed to the features of novelty just pointed out and the case is believed to be in condition for allowance.

Very respectfully,

JAMES R. TOWNSEND,
Att'y for Wintroath.

Application Room,
Jun- 26, 1913,
U. S. Patent Office.

Division 9,
Jun- 27, 1913,
U. S. Patent Office.

Paper No. 5.

In the United States Patent Office.

Division 9, Room 142.

John a Wintroath. Well Mechanism. Filed Dec. 2, 1912. Serial No. 734,649.

B.

Hon. Commissioner of Patents, Washington, D. C.

SIR: No action has yet been received responsive to applicant's amendment dated May 14, 1913. In view of the oral *interview with the Examiner, please add the following supplementary amendment. Re-write claim 4 as follows:*

B'. 2c [4].* In deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft driven from above and extending downward to said impeller, said power shaft being adapted to transmit power to said impeller, a fluid operated bearing located substantially at the top of said power shaft for supporting said shaft and impeller on a fluid surface, positively operated means separate from and in addition to said pump for supplying fluid pressure to said fluid bearing and auxiliary bearing means for sustaining any resultant downward thrust of said power shaft.

Insert C'. C'.>

*In applicant's paper number 3, page 2 lines 6 to 9 cancel "The centrifugal pumps * * * and more as a lower limit.*

23

Page 11, after line 29 of the original specification, please insert the following paragraph:

[*Words and figures enclosed in brackets erased in copy.]

B². The provision of the auxiliary bearing means for sustaining any resultant downward force of the shaft over and above the force counterbalanced by the fluid bearing, is very important in pump installations for the following reason: The installation is usually driven directly or indirectly either by an electrical motor, a gas engine or other source of motive power. The speed variations of the prime mover are minimized as much as possible considering the practical conditions of operation but there may, however, be some speed variations

Insert C³. ^ C³ [to which the shaft 13 is subject],* and

these variations are, of course, beyond the control of the operator. If the speed of the shaft goes up the rotary speed of the impeller would also go up and the velocity at which water is raised by the installation would increase. Dur-

Per C. ing this period of changing velocities the [actual weight or]* downward thrust of the long power shaft would also change due to the changing reaction of the long column of water on the impeller. These velocity changes and the corre-

, with certain types of impellers

" " sponding thrust changes may [sometimes]* become so considerable as to be serious, and are

aggravated

B². [avoided]* somewhat by the torsional coil and recoil of the long shaft. It being impossible

vary

Per C. from a practical standpoint to [regulate]* the

in accordance

" " pressure of the fluid bearing [so as to conform]* with the velocity changes and corresponding thrust changes of the shaft, it [it]* becomes

advantageous

" " [necessary]* to provide the supplementary bearing means for supporting the resultant downward thrust on the shaft. In this event, the fluid pressure on the fluid bearing may be set for the normal velocity and thrust of the shaft and when this velocity

fluid is not pressed out of the

Per C. and thrust increase the ^ fluid bear-

Insert C⁴. Per C. ing ^ [does not become destroyed.]*
C⁴

but the resultant downward thrust is taken up by the supplementary bearing in casing 79.

[* Words and figures enclosed in brackets erased in copy.]

From this the peculiar co-operation between my novelly located fluid bearing and supplementary bearing with a pump located far down along the power shaft may be clearly understood."

[Matter enclosed between rules erased in copy.]

As was carefully pointed out at the oral interview with the Examiner the following circumstances should also be further carefully considered in addition to the argument in applicant's paper No. 3. The applicant does not claim to be original in locating some sort of bearing at the top of a power shaft in pump installations because formerly bearings resembling applicant's supplementary bearing in casing 79 have been frequently located at the top of shafts for relatively shallow installations. This seems to have been the common practice for many years where the installation did not run into the relatively deep well class, but as the pumping depth became greater these roller bearing systems became more impracticable because of the rapidity with which they wore out under the heavy strain of the long shaft, the impeller and the reaction of the long column of water. When the pumping art, however, as practised with the rotary centrifugal pump, attempted to penetrate further and further into the earth it became necessary to invent some new form of bearing system to replace the old roller bearings at the top of the shallow installations. The art of record as illustrated by Price and other references which may be cited show how the hydraulic engineers solved the question of a more adequate bearing system for their relatively deep well pumps. As far back as 1894, the problem seems to have been solved by providing a fluid bearing which was operated by the main fluid pump itself. This was an obvious suggestion in view of the necessary existence of the main pump itself, as a source of hydraulic pressure for the bearing, and in view of this misleading suggestion the art has continued to hamper itself with fluid bearings which were necessarily located [far]* considerably below the top of the long shaft and reasonably close to the pump itself. The difficulties and shortcomings of this construction have been amply brought out in applicant's argument in Paper No. 3 to which reference should be had. To summarize the argument there presented, it should be very carefully noticed that the disadvantages of the Price combination arise from the inaccessibility of the hydraulic bearing both for repairs and for adjustment and also in the fact that the power shaft being supported from some point relatively deep in the well and usually at the main pump itself would

[*Words and figures enclosed in brackets erased in copy.]

buckle like a column from the bearing upward. This buck-
25 ling action becomes more and more serious as the depth of the well increases and the rotary speed being high the bearings located at intervals within applicant's tube 15 naturally became worn very fast. In view of these considerations it must be obvious that the Price combination is replete with inherent embarrassing difficulties under which the pumping art has been suffering for a long period. In considering this very great weight should be given to the fact that all these difficulties have been tolerated despite the fact that fluid operated bearings operated by separate pumps were contemporaneously known in several arts. Applicant makes no claim in this present application for having invented any broad combination of a fluid operated bearing and a separate source of a fluid pressure because such a combination was at hand for many years and might be said to have always been a suggestion as to how to modify the Price combination so as to avoid its embarrassing and inherent features. The fact remains, however, that despite this supposed suggestion, the pumping art has continued along the lines of the Price combination and the length of time through which they have endured its difficulties should be a clear indication of the remoteness of the several portions of the prior art which may now seem to have been suggestions prompting the applicant's novel and improved combination.

It is submitted that [the fact that]* after the applicant has made the changes in the Price construction and has carefully pointed out its advantages and the extent to which the art has been thereby advanced, it might not be difficult to see how prior devices *might* have suggested the improvement if some one had been sufficiently alert to note their suggestion. If, however, these prior devices *really* constitute any suggestion at all, the length of time through which they were ignored should be clear evidence of the dimness and uncertainty of their suggestiveness.

The applicant has not merely substituted an old form of separately operated hydraulic bearing for the old roller bearing or thrust bearing at the top of pump shafts of relatively shallow pump installations. Such pump installations having been practically limited to relatively shallow depths would not have been the class of installations in which the applicant's avoidance of the buckling could have been shown or displayed. This is probably because the buckling feature does not become of practical importance until the invention is carried over into the relatively deep well class. In this latter class, we first step into the field where the shafts are so long that if supported from below the buckling feature would be very noticeable and disastrous. In this field the Price combination came into its real utility and caused the bearing system to become located down in the well so that the buckling which was possible and probable was given an opportunity to exert its ill effects. In considering applicant's invention attention must, therefore, be fixed on this latter class of deep well in-

[* Words and figures enclosed in brackets erased in copy.]

stallations and on the shaft buckling which existed there. It was in this class of machinery that the applicant made his change, as pointed out in applicant's Paper No. 3, and secured the many advan-
26 tages and improvements in the pumping art as therein recited.

This was primarily a change in the Price combination, therefore, and not in the relatively shallow well installations with the upper roller supports because in the latter the shaft length was not sufficient to suggest the fact that [it]* great advantage was obtained by the suspension feature.

This argument is made for the purpose of clarifying the issue and expediting the prosecution of the case. It is believed that in view of the careful analysis the Examiner will appreciate the position of applicant's invention within the prior art above admitted and that the Examiner will see clearly the advantage which the applicant's invention has made in the pumping art itself.

In conclusion, it should be very particularly noted that the applicant has emancipated this art from the difficulties engrafted on it by following the natural suggestions of the case as represented by Price, etc. In view of the applicant's invention it would now seem that the pumps may be projected to an unlimited depth without fearing trouble and embarrassment from the difficulties which were inherent in the earlier combinations.

All the argument above made, of course, applies to all the claims but in addition to said argument, the matter which has now been specifically incorporated into the specification constitutes further argument for the patentability of claim 4. Of this claim it seems there will be no question whatsoever as to its patentability in the absence of references specifically disclosing the combination claimed.

The case is believed to be in condition for allowance and a favorable action is requested.

Very respectfully,

ROBERT A. STEPS,
Attorney for Wintroath.

June 26, 1913.

P. S.—In considering the foregoing analysis it will, of course, be understood that in practice the distinction between the so-called relatively shallow pump class and the relatively deep pump class is not a very sharp one but as is usual in such cases the classes overlap and the structures which are best adapted for either class also overlap into the other class.

ROBERT A. STEPS,
Att'y for Wintroath.

[* Words and figures enclosed in brackets erased in copy.]

27 Paper No. 6.

August 1, 1913.

Robert A. Steps, Mail Desk, Patent Office, Washington, D. C.:

John A. Wintroath. For Well Mechanism. Filed Dec. 2, 1912. Ser. No. 734,649.

This application has been considered as amended June 9, and June 26, 1913.

Claims 1, 2, and 3 are rejected on the ground that they state a very obvious use of the fluid bearing of Holmes, #775,923, Nov. 29, 1904, Class 64-47, in Ames & Fulton, #695,871, Mar. 18, 1902, Pumps, Rotary Single Piston (Cent.), the thrust bearing of the latter being replaced by the fluid bearing of Holmes. In such substitution the functions performed by the bearing of Holmes are those for which it is intended.

Claim 4 is deemed allowable.

F. M. TRYON, *Ex.*

E. L. WALLACE.

Application Room,
Aug. 12, 1913,
U. S. Patent Office.

Division 9,
Aug. 12, 1913,
U. S. Patent Office.

Paper No. 7.

In the United States Patent Office.

Division 9, Room 142.

In re Application of John A. Wintroath. Well Mechanism. Filed Dec. 2, 1912. Serial No. 734,649.

C.

Aug. 9th, 1913.

Hon. Commissioner of Patents, Washington, D. C.

SIR: In response to the Office action of August 1, 1913, please amend as follows:

√*Page 1 of the original specification, line 14, insert:—"partly"—before "supported".*

√*Same page, line 27, after "capacity" and before the insert already made here by applicant's paper 3, insert:—*

C'. A far more serious objection to this bending and buckling, however, is the fact that the rapidly rotating shaft then quickly wears out the series of bearings which give lateral support along its length.

28 √*Page 2, line 14, change "at" to: —near—.*
√*Page 4, line 12, cancel the period after "10" and insert:—,*

C². both of which are conventionally shown and represent casings and impellers of any variety whatsoever.

In the addition made to page 11, line 29 of the original specification and presented on pages 1 and 2 of applicant's amendment of June 26, 1913, please make the following changs:—
√*Page 2 of said amendment of June 26, and line 4 thereof, change "to which the shaft 13 is subject" to:*

C³. —due to voltage changes when the electric motor is used or to changes in the quality of the gas when a gas engine is used,—

√*Same page, line 9, cancel "actual weight or".*
√*Same page, line 13, change "sometimes" to:*—, with certain types of impellers—.
√*Same page, line 16, "regulate" to: —vary—.*
√*Same page, line 17, change "so as to conform" to:* —in accordance—.
√*Same page, line 18, change "necessary" to: —advantageous—.*
Same page, line 23, before "fluid" insert —fluid is not pressed out of the—.
√*Same line, after "bearing" insert:*

C⁴. —so as to permit the metallic parts of the latter to wear upon and destroy themselves—.

√*Same page, lines 23 and 24, cancel "does not become destroyed".*
√*Same page, lines 25 to 28, cancel "From this, the peculiar * * * may be clearly understood." and substitute:—*

C⁵. The above described reaction of the water column is most noticeable with impellers which work partly on a screw principle so as to directly push the water upward. It should also be noticed however that various other distributions of the total shaft thrust between the fluid operated bearing and the supplemental bearing can readily be made. For instance, the pressure in the fluid bearing may be kept at a slightly lower value than that supposed above so that the shaft is always supported somewhat by the supplementary bearing. In this event the shaft will certainly not have any upward or downward movement whatsoever regardless of slight variations of the pressure in the fluid bearing but the exact vertical position of the shaft will be determined by the bearing surfaces in the supplementary bearing. In this sense the fluid operated

bearing might be spoken of as a fluid balance serving to balance the greater part of the shaft weight and leaving only so small a portion of the weight as may be readily carried by a supplementary bearing, this latter portion of the weight also serving to hold the shaft steady despite pressure fluctuations in the fluid bearing. Though the supplementary bearing may be located at any preferred or desired point it is a further advantage to have it also located near the top of the shaft and in reasonably close proximity to the fluid operated bearing. In this event the long and heavy power shaft depends from both bearings and by its own weight tends to draw itself into a substantially straight vertical line. Such location of the bearing means not only makes the same very accessible for repair and adjustment but also improves the performance of the shaft materially.—

29

C5.

√ *In the original specification, page 7, line 30, after "2,000" add:*
—pounds or—.
√ *Cancel claims 2 and 3 and re-write claim 1 as follows:*

C6. 1. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft having such length that the shaft would buckle seriously if supported from below, said shaft being driven from above and being adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said long shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, and positively operated means separate from and in addition to said pump means for supplying fluid pressure for said fluid bearing.

√ Renumber the allowable claim 4 as 2, and add the *following claim:*—

C7. 3. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a long downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said long shaft, auxiliary bearing means for sustaining any resultant downward thrust on said shaft, said fluid operated bearing and said auxiliary bearing means both being located substantially at the top of said power shaft so that the long shaft depends therefrom and by its own weight tends to draw itself into a substantially straight vertical line, and positively operated means

separate from and in addition to said pump means for supplying fluid pressure for said fluid operated bearing.

Insert D¹. D¹.>

30 *Remarks.*

The references last cited and the remarks of the Examiner have been very carefully reviewed. It should be noticed, however, that the isolated structures shown in the two patents to Holmes and Ames of record merely disclose a state of the prior art which was admitted by the applicant's amendment dated June 26, 1913.

The present claims 1 and 3 have been re-written, however, so as to more clearly point out the applicant's invention, and in support of said claims the Examiner is requested to give very careful consideration to the arguments already pointed out in applicant's last amendment.

In view of the arguments just referred to, and in view of the careful wording of the present claims, it is hardly believed that the Examiner will adhere to his contentions. On the question of the obviousness of a substitution as suggested in the Office action, the state of the prior art at least raises a very strong presumption against the position taken by the Examiner. The previous argument by applicant is rather full on this point, but notwithstanding the following statements seem appropriate.

Even Ames was not the first inventor to suspend a pump shaft from above for, in *relatively shallow wells* this seems always to have been the custom. When the depth of the well, however, became greater so that the weight of the shaft became too heavy for a bearing such as shown even by Ames, the hydraulic engineers followed the *obvious* suggestion of Holmes and others and associated a fluid operated bearing with pump mechanism such as shown in Ames. In truth, *this* was an *obvious* step because fluid bearings have been especially devised for use in those very cases where thrusts became too great for ordinary thrust bearings or even for roller bearings, as in Ames. At this point in the argument, it should be noticed, however, that the most conclusive test as to what was really *obvious* should be controlled by the history of the art itself, and the patent to Price of record aptly illustrates this subsequent history. For various reasons, Price and others used fluid operated bearings, but preferred to operate them by pressure sources derived from the main pump [bearing]* itself and, therefore, were compelled to locate their fluid bearing at some point down near the pump. Some advantages are perhaps attained by this arrangement but so far as the record shows, these inventors were altogether *unconscious* of the serious disadvantages and damaging features which such an arrangement included, and which were brought into the case *just* because the shaft length was gradually changing from the relatively short length for which the Ames construction was satisfactory to the relatively longer

[*Words and figures enclosed in brackets erased in copy.]

lengths for which a fluid operated bearing was practically essential. These difficulties consist generally, of the fact that in Price and others, the fluid bearing partly supported the shaft from a relatively low point so that the shaft above this point tended to bend
31 or buckle, and it must be remembered that in these heavy shafts, frequently rotating at very high speeds, the bending and buckling obviously weaken the shaft very much and also rapidly wear out the series of bearings which laterally support the shaft along its length. Furthermore, these disadvantages and difficulties would not have been serious if the shaft length had been short and it should be easily conceivable that the attention and painstaking analysis of the *inventor* were necessary to observe that these disadvantages gradually accrued as the shaft length increased from the shorter lengths to the longer lengths where fluid operated bearings are imperative. To one who is unconscious of these matters, the obvious association of a fluid bearing with pumping mechanism would have been as in Price of record, instead of at the top in substitution of the Ames bearing, and this is conclusively emphasized by the history of the art itself.

Now that the applicant has pointed out these disadvantages it may indeed seem *obvious* that they could always have been avoided and that well pumping mechanism should have been made perfect at the start by associating the fluid bearings with relatively deep well mechanism in the manner disclosed by the applicant, but the history of invention includes a long series of valuable *patented* improvements which after being disclosed by their author were so easy to understand that one is perplexed and astonished that the improvement was not available from the start.

The Examiner states that in substitutions such as he suggests "the functions performed by the bearing of Holmes are those for which it is intended". As showing that this is probably not correct, however, it should be noted that Holmes' bearing *contains no suggestion, of supporting a long, heavy, rapidly-rotating shaft substantially at the top so that the shaft depends from the bearing and by its own weight tends to draw itself up into a substantially straight vertical line.* In other words, the Holmes' bearing is not specially *intended* to suspend a long shaft in such manner as will give it the greatest strength and which will prolong the life of the bearings which give lateral support to it. It was for these very reasons, however, and to secure these beneficial results that the applicant located his fluid operated bearings in the top of the shaft instead of at some lower point as in Price; and the claims now embracing all the features whereby these notable improvements in the performance of deep well mechanism are obtained and being drawn specifically to the applicant's novel arrangement, should be allowed.

In view of the benefits which the applicant's invention confers upon the art, first, by making the bearing of Price accessible for repairs and adjustments; second, by materially improving the performance of the long, heavy, rapidly rotating power shaft of relatively deep well pumping mechanism, and third by making it possible now to sink wells apparently to unlimited depths, it is hoped that the Ex-

aminer will not longer delay the reward of legal protection which the Patent Statutes contemplate in such cases.

32 The case is now thought to be in condition for allowance and favorable action is requested.

Very respectfully,

ROBERT A. STEPS,
Attorney for Wintroath.

August 9, 1913.

Application Room,
Aug. 12, 1913,
U. S. Patent Office.

Division 9,
Aug. 12, 1913,
U. S. Patent Office.

Paper No. 8.

In the United States Patent Office.

Division 9, Room 142.

In re Application of John A. Wintroath. Well Mechanism. Filed December 2, 1912. Serial Number 734,649.

D.

Aug. 12th, 1913.

Hon. Commissioner of Patents, Washington, D. C.

SIR: Please add the following supplementary amendment to applicant's amendment of August 9, 1913.

Page 2, line 19, of the original specification after "obviated" insert:

D'. —Also the relatively long and usually rapidly rotating power shafts embraced in this invention will not abuse the bearings which may give it lateral support along its length, because this invention contemplates particularly that the shaft shall practically depend from the fluid bearing located near its upper extremity [and]* so that the weight of the shaft draws it into a substantially straight vertical line instead of permitting it to buckle onto its bearings as when partly supported from below.

√*Page 4, lines 21 and 22, change "are rigidly connected* * * * *power shaft 13" to:*—may be connected in any suitable manner to the long power shaft 13[.]*"

√*Same page, line 27, insert "long" before "power" and insert* √ √
"novelly" before "supported".

Page 5, line 6, insert:—"part of" [the]" after "that".* √ *Page*

[*Words and figures enclosed in brackets erased in copy.]

8, line 3, change "is preferred that the shaft be" to:—might seem to be a preferred mode of operation to have √the shaft—.

√*Page 11, line 18, after "understood" insert the following—*

D². 33 All of the above described construction discloses in detail one form of mechanism whereby the benefits of this invention may be secured. It will be understood, though, that many of these details may be varied very extensively without departing from the spirit of this invention as claimed below. Thus, this invention is not avoided by using any other suitable form[s]* of fluid operated bearing whatever, so long as it is located substantially at the top of the relatively long power shaft so that the shaft practically depends
D². from the bearing and by its own weight tends to draw itself into a substantially straight vertical line. Though it is preferable also to use auxiliary or supplementary bearing means for the purpose of supporting any upward or downward thrusts on the power shaft, nevertheless an operative structure is produced without any of these supplementary bearing means, and this structure is also included in this present invention. This being so, it is, of course, understood that the auxiliary bearings may take any form whatsoever without regard to the above described details which show only one form of the invention.

√*Page 12, line 17, in case the words "with" after "along" and* √ *"and rattling" after "vibratory" are not found in the Office file, please insert these words in these respective places.*

√*Page* 12 ∧ [*12*]* *immediately after line 17, insert the following:*—

D⁸. Attention will now be called to another feature of the invention. As has been above described, the auxiliary bearing in casing 79 includes the boss 80′ having the concave seat 82, for supporting the appropriately-shaped bearing casting 83, while by reference to Figs. 1 and 7, it will be seen that the fluid operated bearing has a certain amount of play and clearance both between the depending rim 47 and plate 42, and between the balancing plate 46 and plate 42. Before stating the several purposes of this construction, it may be noticed, however, that in practice the actual play between the depending rim 47 and the plate 42 is not so great as has been illustrated in Figs. 1 and 7 and, in fact, is usually so small that it would be impossible for the Figures to show it if it were drawn in correct relative proportion to the remainder of the mechanism. In practice, this play need only be as great as would be encountered in a very loose bearing fit, but

[*Words and figures enclosed in brackets erased in copy.]

for the purpose of bringing it out, this has been considerably exaggerated in Figures 1 and 7.

These features in the auxiliary bearing and in the fluid operated bearing are introduced so that the bearings may
34 accommodate themselves to the shaft as the axis of the
D[3]. latter may from time to time tend to swing or shift around in the bearings with a pendulum action. It is quite essential to the perfect performance of a bearing system at the top of long pump shafts that such swinging reactions should be allowed for, because the shaft 13 penetrating deep into the earth may have its lower end pushed around considerably by the *un-* uniform sliding or settling of the various layers of earth through which the shaft passes. On this account, the sand approximately in the region of the pump may shift the latter,—and, therefore, the lower extremity of the shaft—somewhat to the side. The shaft being rigidly connected to the balancing plate in the fluid operated bearing, will, therefore, carry this bearing plate over sideways and unless the above referred to play were allowed in the fluid operated bearing the latter would force its parts together unusually hard so as to wear them fast, while the fluid operated bearing would also hold the upper extremity of the shaft in a flexed and strained position with reference to the lower parts of the shaft. By the play shown in Fig. 7, however, all this is avoided so that the fluid operated bearing may readily accommodate itself to the shifts which are incident to the axes of all pump shafts. This problem has been previously solved for roller bearings such as shown in the applicant's casing 70 when such roller bearings were used alone, and the appropriately-shaped casting 83 riding in the concave seat 82 has always
D[3] been understood by practical well men to be for the purpose of allowing the roller bearing to accommodate itself to such swinging of the pump shaft, so that this feature need, therefore, not be further described, with reference to the roller bearing.

Please add the following claims:

D[4]. 4. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, positively operated means separate from and in addition to said pump means for supplying fluid pressure to said fluid bearing, auxiliary bearing means for sustaining any resultant downward thrust of said power shaft and aux-

iliary bearing means for sustaining any resultant upward thrust of said power shaft.

5. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft and said fluid operated bearing having play so that the fluid bearing may accom-odate itself to shifting of the shaft axle, and positively operated means separate from and in addition to said pump means for supplying fluid pressure for said fluid bearing.

Remarks.

This case now seems to be in condition for allowance and favorable action is requested.

Very respectfully,

ROBERT A. STEPS,
Attorney for Applicant.

August 12, 1913.

Paper No. 10.

Mar. 21, 1916.

Jas. R. Townsend, San Fernando Bldg., Los Angeles, Cal.:

Patent to John A. Wintroath for "Well Mechanism. Nov. 25, 1913. No. 1,079,679. Application Filed Dec 2, 1912. Ser. No. 734,649.

39,684.

1. In a deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft driven from above and extending downward to said impeller, said power shaft being adapted to transmit power to said impeller, a fluid operated bearing located substantially at the top of said power shaft for supporting said shaft and impeller on a fluid surface, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, and auxiliary bearing means for sustaining any resultant downward thrust of said power shaft.

2. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a long downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said long shaft, auxiliary bearing means for sustaining any resultant downward thrust on said shaft, said fluid operated bearing

and said auxiliary bearing means both being located substantially at the top of said power shaft so that the long shaft depends therefrom and by its own weight tends to draw itself into a substantially straight vertical line, and means for supplying fluid under pressure to
36 said fluid bearing independently of the action of the pump means.

3. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, auxiliary bearing means for sustaining any resultant downward thrust of said power shaft and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft.

The interference involves your patent above identified and an application for "Deep Well Pumps", filed by Matthew T. & Mark C. Chapman, whose post office addresses are Care, The American Well Works, Aurora, Ill. whose attorneys are Adams & Jackson, of Monadnock Block, Chicago, Ill., and whose assignee is The American Well Works, of Aurora, Ill.

The relation of the counts of the interference to the claims of the respective parties is as follows.

Counts.	Chapman & Chapman.	Wintroath.
1	1	2
2	2	3
3	3	4

P. D. HASKELL,
Acting Ex'r.

F. W. B.

(Here follow diagrams and specification marked pp. 37 to 46 inclusive.)

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J. A. WINTROATH.

WELL MECHANISM.

APPLICATION FILED DEC. 2, 1912.

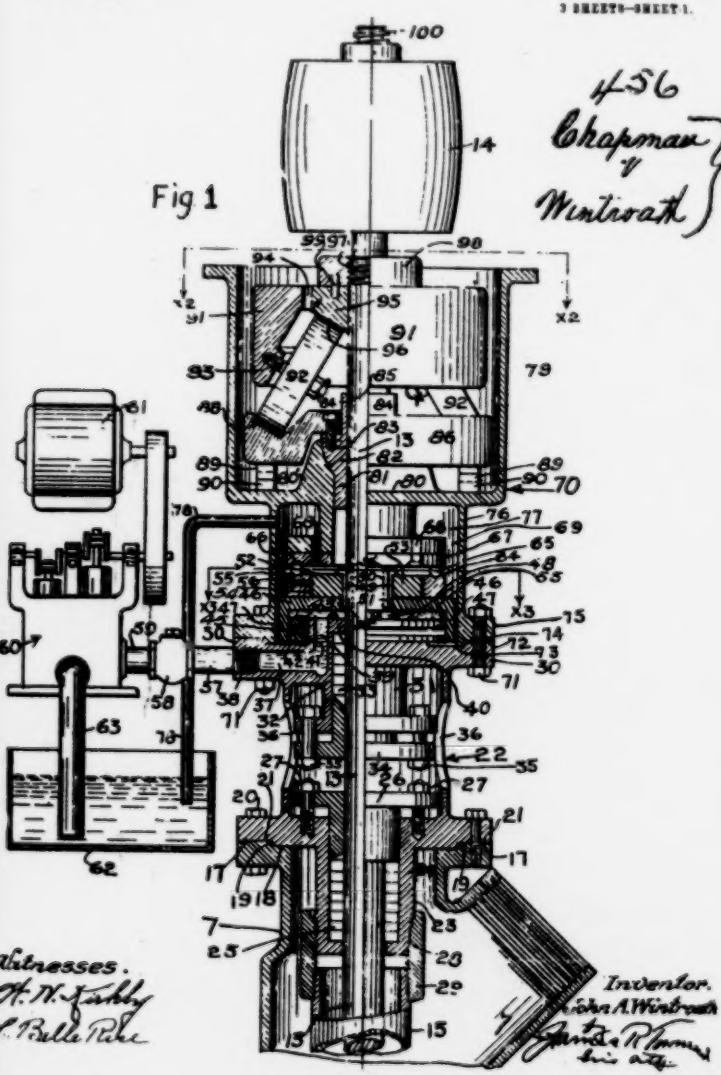
1,079,679.

Patented Nov. 25, 1913.

3 SHEETS—SHEET 1.

456 Chapman v Wintroath p37

Fig 1



Witnesses.
H. W. Ashby
L. Belle Pike

Inventor.
John A. Wintroath
by James R. Thomas
his Atty.

38

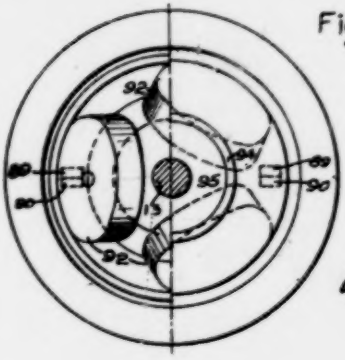
J. A. WINTROATH.
WELL MECHANISM.
APPLICATION FILED DEC. 9, 1913.

1,079,679.

Patented Nov. 25, 1913.

2 SHEETS—SHEET 2.

Fig. 2



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Chapman
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Wintroath
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Fig. 3

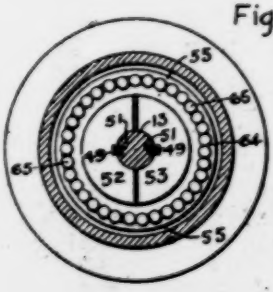

Fig. 4

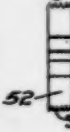

Fig. 5

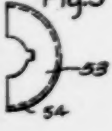

Fig. 6

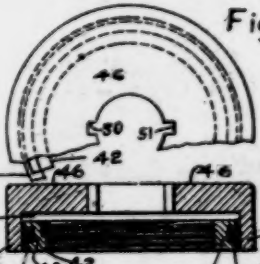

Fig. 7

Witnesses
H. N. Ashby
L. Belle Rice

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his atty

39

J. A. WINTROATH.

WELL MECHANISM.

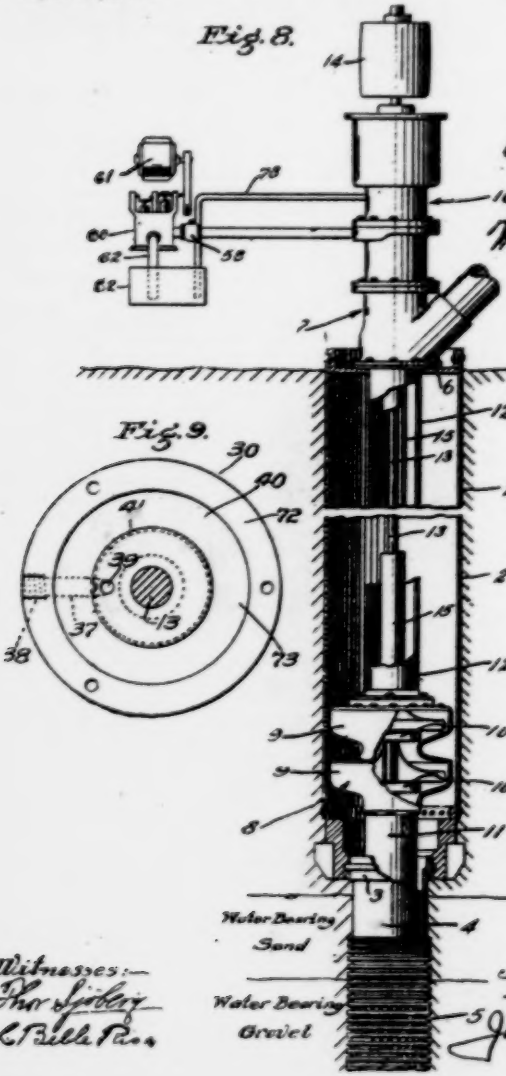
APPLICATION FILED DEC. 8, 1913.

1,079,679

Patented Nov. 25, 1913.

3 SHEETS—SHEET 3.

Fig. 8.



456 Chapman vs. Wintroath } p. 39.

Fig. 9.

Witnesses:—
Thos. Sperry
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5 Ex J

UNITED STATES PATENT OFFICE.

JOHN A. WINTROATH, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO LAYNE & BOWLER CORPORATION, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

WELL MECHANISM.

1,079,679. Specification of Letters Patent. Patented Nov. 25, 1913.

Application filed December 2, 1912. Serial No. 734,649.

To all whom it may concern:

Be it known that I, JOHN A. WINTROATH, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Well Mechanism, of which the following is a specification.

In pumping wells used for withdrawing water or other liquids from the earth a casing is sunk, often several hundred feet into the earth, and at the bottom of said casing a rotary pumping means is installed for raising the water or other liquid to the surface. A long power shaft, driven from above, extends down through the casing and transmits power to the rotary pumping means below. The means for supporting said rotary pump and the long power shaft involves considerable inconvenience. In some pumping systems the rotary pumping parts and power shaft are partly supported from below by means of a delicate hydraulic bearing located at the bottom of the casing, and said hydraulic bearing is operated by the same water pumped through the well. This construction, however, is subject to the following inherent defects: The bearing, being operated by well water, which obviously carries some sand and grit from its origin, soon rusts and wears, and its operation becomes quite unsatisfactory. Also said delicate hydraulic bearing, being located at the bottom of the well casing, is practically inaccessible; and due to the frequent repairs required on same, its up-keep involves considerable annual expense. Also the long heavy power-transmitting shaft tends to bend or buckle when supported from below, and this tendency materially impairs its power-transmitting capacity. A far more serious objection to this bending and buckling, however, is the fact that the rapidly rotating shaft then quickly wears out the series of bearings which give lateral support along its length.

According to the very principle of those fluid bearings which derive their fluid pressure from the main well pump itself, those bearings must necessarily submit to the above defects. Such a bearing must be located down reasonably close to the pump itself. If it were located anywhere near the top of the power shaft the liquid from the well pump would have practically no pressure head at the level of the bearing, and from a practical standpoint would therefore be incapable of producing an upward reaction sufficiently adequate to support or float a long suspended shaft and impeller. Such bearings must therefore be located at some point down on the shaft and access to them is consequently difficult. The higher up such bearings are placed the more cumbersome and large must be their construction, because they must support a definite weight and at higher levels have less fluid head with which to do it; while when such bearings are placed lower down and close to the well pump they become very inaccessible, and the rattling and buckling tendency of that portion of the shaft above the bearings becomes pronounced and detrimental. Putting such a bearing down close to the pump, however, sometimes makes it possible to use a reasonably small and convenient bearing, and in practice this position is therefore the most practical despite the difficulty of access.

The invention includes a novelly-constructed fluid operated bearing novelly located at the top of the long power shaft which extends down to and operates the pump. The relatively high fluid pressure is supplied to this novelly-positioned bearing, from some source separate from the main well pump itself, and on this account it is possible to locate the bearing practically at the top of the shaft and immediately at or reasonably near to the surface of the earth. This position makes it perfectly accessible to repairs and makes it possible to suspend practically the whole length of the shaft. All rattling and buckling of the shaft is thereby eliminated and the installation runs smoothly and practically without vibration.

An object of the bearing means embraced in my invention is to reduce the friction created by supporting the rotary pumping parts and the vertical power shaft. To this end I provide the novel fluid operated bearing hereinafter described.

Another object is to provide durable and efficient bearing means for supporting the vertical power shaft and the rotary pumping parts, which bearing shall be easily and conveniently accessible at the surface of the earth. To this end I provide above the pit casing, and near the upper extremity

of the power transmitting shaft, a novelly constructed bearing which may be readily dismantled for inspection and repairs. As will be hereinafter described the vertical power shaft and the rotary pumping means are suspended from the bearing, and the buckling and weakening tendency of said power shaft is thereby obviated. Also the relatively long and usually rapidly rotating power shafts embraced in this invention will not abuse the bearings which may give it lateral support along its length, because this invention contemplates particularly that the shaft shall practically depend from the fluid bearing located near its upper extremity so that the weight of the shaft draws it into a substantially straight vertical line instead of permitting it to buckle onto its bearings as when partly supported from below.

Another object is to avoid excessive wearing and rusting of the bearing parts and at the same time to efficiently lubricate the same. To this end I use lubricating oil under pressure for operating the novel fluid bearing hereinafter described.

Other objects may appear from the following detail description taken in connection with the drawings.

The following drawings illustrate my invention.

Figure 1 is an elevation partly in axial section through the bearing embraced in my invention and shows the same attached to the upper end of the pit casing. The axial section is taken through the whole bearing casing, but only through the left half of the bearing core while the right half of said bearing core is shown in full. Fig. 2 is a plan section taken on line x^2—x^2, Fig. 1. The left half of the roller casing has been removed in order to expose the position of the roller beneath. Fig. 3 is a plan section on line x^3—x^3, Fig. 1. Fig. 4 is an end view of one segment of a split collar used in my bearing. Fig. 5 is a plan view of the split collar shown in Fig. 4. Fig. 6 is a fragmental plan view of a balancing plate, wear plate, and packing ring used in my bearing. Fig. 7 is an axial section of the same parts shown in Fig. 6. Fig. 8 is a fragmental view illustrating the well mechanism in place and broadly shows the novel combination of parts embracing my invention. Fig. 9 is a plan view of one of the bearing castings.

Into the earth 1 is sunk a cylindrical drum 2 shown in Fig. 8 and termed a pit casing. At the lower extremity of pit casing 2 the coupling member 3 connects said pit casing to a well casing 4, said well casing having a lower screened and perforated portion 5; and at the upper extremity of said pit casing the flange plate 6 connects said pit casing to a discharge Y 7. The well casing 4 projects down into the water bearing sands and gravels and is adapted to form a well reservoir from which the rotary pumping means 8, located in pit casing 2, and usually near the bottom thereof, may draw its water supply.

The pumping means 8 comprises a stationary pumping casing 9 and a rotary impeller 10, both of which are conventionally shown and represent casings and impellers of any variety whatsoever. At its lower end the pump casing 9 is connected with a suction pipe 11 extending into the well casing 4 and being adapted to conduct water up to the pump casing; and at its upper end said pump casing is connected to a water conduit 12, the latter serving to conduct the pumped water up to the discharge Y 7. This water conduit 12 is rigidly connected to the discharge Y above, and in an obvious manner serves to support the pump casing 9 and the suction pipe 11 in their operative positions. The impeller or rotary pumping parts 10 may be connected in any suitable manner to the long power shaft 13 which extends down through the pit casing 2 and which is driven from above by means of a pulley 14. A small pipe 15 supported as hereinafter described surrounds power shaft 13, and is adapted to contain an oil bath wherein said power shaft runs. The weight of the impeller and of the long power shaft are novelly supported and suspended at the surface of the earth in a novelly constructed and novelly positioned fluid operated bearing 16, the details of which will be described below. When the power shaft 13 is driven the pump impeller 10 will rotate and by means of the suction pipe 11 water will be drawn from the well casing 4 into the pump casing 9. On continued driving of shaft 13 the rotary impeller 10 will force this water up through the conduit 12 and discharge it through the discharge Y 7. It will be understood that part of the weight or downward re-action of the water in conduit 12 is sustained on the impeller 10, and must be added to the weights of said impeller and power shaft 13 in considering the total weight supported above in bearing 16. The details of this bearing will now be described.

The upper face of the discharge Y 7, Fig. 1, is formed with two offset seats 17 and 18 joined by the shoulder 19, and by means of bolts 20 the similarly but conversely formed face 21 of the casting 22 is securely attached to the discharge Y. From the lower face of casting 22 depends a cylindrical portion 23 which loosely surrounds the power shaft 13 and forms about same the packing chamber 24 containing the packing 25. The usual packing gland 26 extends into the packing chamber 24 and is secured to and adjusted on casting 22 by means of bolts 27. The lower extremity of the depending cylindrical portion 23 is provided with threads

28 upon which is secured a similarly threaded coupling 29. The upper extremity of oil-containing pipe 15 is seen to be similarly threaded also, Fig. 1, and by screwing same into coupling 29 a complete and adequate support for said pipe is provided. The casting 22 terminates above in a flange 30, from the lower face of which depends another cylindrical portion 31 which embraces power shaft 13 so as to form another packing chamber 32 containing packing 33. The usual packing gland 34 extends into chamber 32 and is secured to and adjusted on cylindrical portion 31 by means of bolts 35. In order that the aforesaid packing glands and bolts may be accessible for inspection and adjustment two hand holes 36 are provided in opposite sides of the casting 22. The flange 30 is thickened at one side so as to provide sufficient metal through which the horizontal fluid conduit 37 may pass. At its outer extremity said conduit is provided with threads 38 and at its inner extremity said conduit joins the vertical conduit 39, the latter extending up through a cylindrical projection 40, Figs. 1 and 9, which rises from flange 30. The periphery of the projection 40 is threaded as at 41 and a similarly threaded wear plate 42 is screwed upon same. A screw 43 locks wear plate 42 to projection 40 and an ordinary ring slot 44, Fig. 7, permits a packing ring 45 to be sprung around the periphery of wear plate 42.

Above projection 40 and wear plate 42, and spaced apart from same, is positioned a balancing plate 46 having a depending machined rim 47 which coöperates with the packing ring 45, with wear plate 42, and with projection 40, to form the substantially fluid tight chamber 48. The balancing plate 46 rotates with the power shaft 13 and is firmly and rigidly attached to same by means of keys 49 lying in key slots 50 and 51 in the power shaft and balancing plate respectively and fitting snugly between the slot shoulders 50′ and 50″ in the shaft. The keys 49 extend above the balancing plate so that they may be readily withdrawn from slots 51. With this construction it becomes necessary, however, to bind the upper portions of said keys tight into the slots 50 of shaft 13; and for this purpose I provide a split collar comprising two removable segments 52 and 53 best shown in Fig. 3. The segments of this split collar embrace the keys 49 and when in position serve to bind them tightly into the aforesaid slots. The periphery of the segments 52 and 53 is provided with screw-threads 54, Figs. 4 and 5, and a similarly threaded annular collar 55 is screwed onto segments 52 and 53 and serves to rigidly hold them in position. The set screw 56 is also provided and sets the collar 55 firmly onto segment 52. By this construction balancing plate 46 may be easily and rapidly disconnected from the power shaft 13, and is also rigidly connected with said shaft in such manner that all the weight carried by the shaft may be imparted to and sustained by the balancing plate 46.

It will be seen that the fluid tight chamber 48 is bounded above by the balancing plate 46 and is connected below through conduit 37, pipe 57, safety valve 58 and pipe 59 to the fluid pump 60. This pump is of any preferred construction and is shown to be driven by an electric motor 61. An oil-containing reservoir or sump 62 is located beneath safety valve 58 and a suction pipe 63 extends into the oil in said sump and is adapted to conduct same to the fluid pump 60. When motor 61 drives pump 60, oil from the sump 62 will be forced under high pressure through pipe 59 into the fluid tight chamber 48 where its pressure will act upwardly on balancing plate 46. If the fluid pressure in said chamber is correctly chosen its upward effort on the balancing plate 46 will balance all the weight of shaft 13 and the parts supported by same. In this condition the power shaft is said to float, and its weight will be suspended from or supported on the upper surface of the fluid in chamber 48. As the shaft rotates in this floating condition the supporting friction of same will be slight and will include only the resistance between the supporting fluid surface and the balancing plate 46, and between the packing ring 45 and the ring slot 44. The shaft 13 often runs approximately at 1000 revolutions per minute and supports a total weight of 2000 pounds or more; and I have found that under these conditions suspension from a fluid surface is essential if durability and efficiency are to be attained. It might seem to be a preferred mode of operation to have the shaft always suspended in a floating condition, but in practice several effects conspire and make constant floating difficult. The fluid pressure in chamber 48 is sometimes either superfluous or deficient, so that a summation of shaft forces, including the fluid pressure on the balancing plate, the shaft weight, the impeller weight and the water weight will leave a resultant upward or downward force of the shaft. Safety valve 58 is of ordinary conventional construction and tends to prevent any surplus fluid pressure on the balancing plate 46, the safety valve operating to release a portion of the fluid acting on the balancing plate and thereby eradicating the surplus pressure referred to. The fluid released by the safety valve will drop into the oil sump beneath, thereby preventing any waste of same. As a safeguard, however, against failure of the safety valve 58 I provide auxiliary bearing

means adapted to sustain any resultant upward force of the shaft, said upward force being occasioned by surplus fluid pressure on the balancing plate 46. This auxiliary bearing means is located directly above collar 55 and comprises the following parts: A circular ball race 64' is cut in the upper surface of collar 55, and a series of hard steel anti-friction balls 65 are adapted to run in the same. Above said balls, and spaced apart from same, is another ball race 66 cut in a wear plate 67. Wear plate 67 is attached by screws 68 to a neck 69 depending from a casting generally referred to as 70, the said casting being rigidly secured at its lower end to casting 22 by means of bolts 71. By providing this auxiliary bearing means the objection to superfluous fluid pressure in chamber 48 is overcome, because the resultant upward shaft force will be adequately sustained by the anti-friction balls 65 and wear plate 67.

The upper face of flange 30 is formed with two offset seats 72 and 73 joined by the vertical shoulder 74, and the lower face of flange 75, of casting 70, is formed with both similar but conversely offset seats. The offset seats 17 and 18 on the discharge Y 7 and casting 22, and also the offset seats 72 and 73 of the castings 22 and 70, serve to maintain the discharge Y and the castings 22 and 70 in perfect alinement, and additionally serve to provide fluid tight joint between said elements. Above flange 75 the casting 70 is built with a cylindrical portion 76 which forms a second chamber 77 surrounding and including both the fluid tight chamber 48 and the auxiliary bearing means above referred to.

Under normal operation fluid will slowly leak from the chamber 48 past the packing ring 45 into the chamber 77. There being no escape for this fluid from the lower part of chamber 77 the same will gradually fill said chamber until the whole of the balancing plate and also the balls 65 of the auxiliary means will be immersed. An overflow pipe 78 taps chamber 77 above the auxiliary bearing means and serves to conduct the fluid from chamber 77 back to sump 62 when said fluid rises above the level of said overflow pipe. For purposes of clearness, however, the operating fluid has been omitted from chamber 77.

By choosing clean oil as the fluid for operating my bearing, no sand or grit will be injected between the active parts and a good wearing capacity will be thereby procured. Also there will be no rusting tendency of the bearing parts and the delays and danger introduced by rusted metal will be avoided. Also the whole of the fluid bearing and the auxiliary bearing means being immersed in the oil, an efficient and adequate lubrication will always exist at every friction point. Also by providing overflow pipe 78 no oil is wasted and economy of operation is a prominent feature in my installation.

As a safeguard against pressure deficiency of the fluid in chamber 48 I provide a second auxiliary bearing means located within the cylindrical portion 79 of casting 70. A web 80 extends across casting 70 between the cylindrical portions 76 and 79 and from said web rises a boss 80'. An enlarged aperture 81 is provided in said boss and permits power shaft 13 to pass through same, the said aperture being flared into an upper concave seat 82. Into aperture 81 and concave seat 82 fits an appropriately shaped casting 83, the same having a projecting drum 84 and a central aperture 85, the latter being adapted to loosely embrace power shaft 13. A circular disk casting 86 is formed with an inclined wheel race 88 extending in a circle completely around said casting. From the bottom of casting 86 depend two lugs 89 positioned so as to interfere with corresponding lugs 90 rising from web 80 of casting 86. The lugs 89 and 90 cooperate to arrest and prevent rotation of casting 86 and casting 83 around shaft 13. A cast annular frame 91 carrier three inclined anti-friction wheels 92, Figs. 1 and 2, said anti-friction wheels being journaled to the frame by means of pins 93, and said wheels being adapted to run in the wheel race 88. The cast frame 91 is provided with an aperture 94 and within said aperture is positioned a casting 95 having a lower inclined face 96 adapted to rest and roll upon the inclined anti-friction wheels 92. The power shaft 13 is threaded above at 97, and a similarly threaded collar 98 is screwed rigidly onto the same. The pin 99 projects into the collar 98 and into the casting 95 and rotatively binds same, so that when collar 98 is screwed home, casting 95 and shaft 13 are bound to each other. When there is a pressure deficiency on balancing plate 46 a resultant downward force exists on power shaft 13. This force is transmitted to casting 95 and from same is passed to and sustained on the auxiliary bearing means comprising anti-friction wheels 92 and cast ring 95. As shaft 13 and casting 95 rotate the wheels 92 will roll around the wheel race 88 and due to the relative radial distances of inclined face 96, and inclined wheel race 88 from the center of shaft 13, the cast frame 91 will rotate at a slow speed compared with that of the shaft 13 or casting 95. By this construction the friction necessary to support the rotating shaft is negligible, despite the resultant downward force of same.

At the upper extremity, shaft 13 is provided with a belt pulley 14 rigidly mounted on the shaft by any suitable means such as

the square thread 100, and power is imparted to same by any ordinary belt as will be readily understood.

All of the above described construction discloses in detail one form of mechanism whereby the benefits of this invention may be secured. It will be understood, though, that many of these details may be varied very extensively without departing from the spirit of this invention as claimed below. Thus, this invention is not avoided by using any other suitable form of fluid operated bearing whatever, so long as it is located substantially at the top of the relatively long power shaft so that the shaft practically depends from the bearing and by its own weight tends to draw itself into a substantially straight vertical line. Though it is preferable also to use auxiliary or supplementary bearing means for the purpose of supporting any upward or downward thrusts on the power shaft, nevertheless an operative structure is produced without any of these supplementary bearing means, and this structure is also included in this present invention. This being so, it is, of course, understood that the auxiliary bearings may take any form whatsoever without regard to the above described details which show only one form of the invention.

In starting the well mechanism embracing this invention the pumping means 60 is brought into operation to raise the oil pressure in chamber 48 until the vertical weights or forces on shaft 13 are balanced and said shaft floats on the oil surface. Power is then imparted to pulley 14 and is transmitted by shaft 13 to the impeller 10 which effects the pumping and discharging of the water through discharge Y 7. If for any reason a surplus or deficient oil pressure exists on the balancing plate, the auxiliary bearing means located either within the cylindrical portion 76 or the cylindrical portion 79, of casting 70, will operate to sustain the resultant force of the shaft.

The provision of the auxiliary bearing means for sustaining any resultant downward force of the shaft over and above the force counterbalanced by the fluid bearing, is very important in pump installations for the following reason: The installation is usually driven directly or indirectly either by an electrical motor, a gas engine or other source of motive power. The speed variations of the prime mover are minimized as much as possible considering the practical conditions of operation but there may, however, be some speed variations due to voltage changes when the electric motor is used or to changes in the quality of the gas when a gas engine is used, and these variations are, of course, beyond the control of the operator. If the speed of the shaft goes up the rotary speed of the impeller would also go up and the velocity at which water is raised by the installation would increase. During this period of changing velocities the downward thrust of the long power shaft would also change due to the changing reaction of the long column of water on the impeller. These velocity changes and the corresponding thrust changes may, with certain types of impellers, become so considerable as to be serious, and are aggravated somewhat by the torsional coil and recoil of the long shaft. It being impossible from a practical standpoint to vary the pressure of the fluid bearing in accordance with the velocity changes and corresponding thrust changes of the shaft, it becomes advantageous to provide the supplementary bearing means for supporting the resultant downward thrust on the shaft. In this event, the fluid pressure on the fluid bearing may be set for the normal velocity and thrust of the shaft and when this velocity and thrust increase the fluid is not pressed out of the fluid bearing, so as to permit the metallic parts of the latter to wear upon and destroy themselves, but the resultant downward thrust is taken up by the supplementary bearing in casing 79.

The above described reaction of the water column is most noticeable with impellers which work partly on a screw principle so as to directly push the water upward. It should also be noticed however that various other distribution of the total shaft thrust between the fluid operated bearing and the supplemental bearing can readily be made. For instance, the pressure in the fluid bearing may be kept at a slightly lower value than that supposed above so that the shaft is always supported somewhat by the supplementary bearing. In this event the shaft will certainly not have any upward or downward movement whatsoever regardless of slight variations of the pressure in the fluid bearing but the exact vertical position of the shaft will be determined by the bearing surfaces in the supplementary bearing. In this sense the fluid operated bearing might be spoken of as a fluid balance serving to balance the greater part of the shaft weight and leaving only so small a portion of the weight as may be readily carried by a supplementary bearing, this latter portion of the weight also serving to hold the shaft steady despite pressure fluctuations in the fluid bearing. Though the supplementary bearing may be located at any preferred or desired point, it is a further advantage to have it also located near the top of the shaft and in reasonably close proximity to the fluid operated bearing. In this event the long and heavy power shaft depends from both bearings and by its own weight tends to

draw itself into a substantially straight vertical line. Such location of the bearing means not only makes the same very accessible for repair and adjustment but also improves the performance of the shaft materially.

If at any time the bearing is to be dismantled for repairs the bolts 71 and the pulley 14 are removed, so that the casting 70 may be raised off casting 22 to display the bearing elements beneath. The bearing being located at the surface of the earth is readily accessible for this purpose and, together with the rapidity by which same may be dismantled, a substantial advance in the art is effected. Furthermore, it is a well-known fact that the power-transmitting capacity of shafts under compression is less than the power-transmitting capacity of shafts under tension. By supporting or suspending the heavy power shaft and pumping impeller from above, and thereby operating said shaft under tension, my invention permits a more complete utilization of the power-transmitting capacity of shaft 13 than is possible in the constructions where the shaft and pumping impeller are supported from below. Also, with this arrangement all buckling and bending tendency of the shaft 13, along with its consequent vibratory and rattling tendency, are obviated.

Attention will now be called to another feature of the invention. As has been above described, the auxiliary bearing in casing 79 includes the boss 80 having the concave seat 82, for supporting the appropriately-shaped bearing casting 83, while by reference to Figs. 1 and 7, it will be seen that the fluid operated bearing has a certain amount of play and clearance both between the depending rim 47 and plate 42, and between the balancing plate 46 and plate 42. Before stating the several purposes of this construction, it may be noticed, however, that in practice the actual play between the depending rim 47 and the plate 42 is not so great as has been illustrated in Figs. 1 and 7 and, in fact, is usually so small that it would be impossible for the figures to show it if it were drawn in correct relative proportion to the remainder of the mechanism. In practice, this play need only be as great as would be encountered in a very loose bearing fit, but for the purpose of bringing it out, this has been considerably exaggerated in Figs. 1 and 7. These features in the auxiliary bearing and in the fluid operated bearing are introduced so that the bearings may accommodate themselves to the shaft as the axis of the latter may from time to time tend to swing or shift around in the bearings with a pendulum action. It is quite essential to the perfect performance of a bearing system at the top of long pump shafts that such swinging reactions should be allowed for, because the shaft 13 penetrating deep into the earth may have its lower end pushed around considerably by the ununiform sliding or settling of the various layers of earth through which the shaft passes. On this account, the sand approximately in the region of the pump may shift the latter, and, therefore, the lower extremity of the shaft—somewhat to the side. The shaft being rigidly connected to the balancing plate in the fluid operated bearing, will, therefore, carry this bearing plate over sidewise and unless the above-referred to play were allowed in the fluid operated bearing the latter would force its parts together unusually hard so as to wear them fast, while the fluid operated bearing would also hold the upper extremity of the shaft in a flexed and strained position with reference to the lower parts of the shaft. By the play shown in Fig. 7, however, all this is avoided so that the fluid operated bearing may readily accommodate itself to the shifts which are incident to the axes of all pump shafts. This problem has been previously solved for roller bearings such as shown in the applicant's casting 70 when such roller bearings were used alone, and the appropriately-shaped casting 83 riding in the concave seat 82 has always been understood by practical well men to be for the purpose of allowing the roller bearing to accommodate itself to such swinging of the pump shaft, so that this feature need, therefore, not be further described, with reference to the roller bearing.

From the foregoing detailed description the construction and mode of operation and coöperation of my novel bearing, pumping means, and other elements are thought to be clear.

I claim:—

1. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft having such length that the shaft would buckle seriously if supported from below, said shaft being driven from above and being adapted to drive said impeller means, a fluid operated bearing coöperating to support said shaft, said fluid operated bearing being located substantially at the top of said long shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, and positively operated means separate from and in addition to said pump means for supplying fluid pressure for said fluid bearing.

2. In deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft

n above and extending downward driven fpeller, said power shaft being to said transmi power to said impeller, adapted ated bearing located substantially a fluid opf said power shaft for supporting at the toand impeller on a fluid surface, said shaoperated means separate from and positivel to said pump for supplying fluid in additi said fluid bearing and auxiliary pressureans for sustaining any resultant bearing thrust of said power shaft.

downwaep well pumping mechanism, the

3. In n with pump means including a combinang located beneath the surface of pumpcand rotary impeller means in said the eartl a long downwardly extending casing, ft driven from above and adapted power sid impeller means, a fluid operated to drive cöperating to support said long bearing iliary bearing means for sustaining shaft, assultant downward thrust on said ing smyl fluid operated bearing and said shaft, sbearing means both being located auxiliarlly at the top of said power shaft substanhe long shaft depends therefrom so that own weight tends to draw itself and by bstantially straight vertical line, into a vely operated means separate from and poslition to said pump means for supand in sid pressure for said fluid operated plying bearingeep well pumping mechanism, the

4. Inon with pump means including a combinang located beneath the surface of pump cand rotary impeller means in said the eart a downwardly extending power casing, ven from above and adapted to shaft c drive said impeller means, a fluid operated bearing coöperating to support said shaft, said fluid operated bearing being located substantially at the op of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, positively operated means separate from and in addition to said pump means for supplying fluid pressure to said fluid bearing, auxiliary bearing means for sustaining any resultant downward thrust of said power shaft and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft.

5. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing coöperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft and said fluid operated bearing having play so that the fluid bearing may accommodate itself to shifting of the shaft axis, and positively operated means separate from and in addition to said pump means for supplying fluid pressure for said fluid bearing.

In testimony whereof, I have hereunto set my hand at Los Angeles California this 21st day of November 1912.

JOHN A. WINTROATH.

In presence of—
ROBERT O. STURR,
MAMIE WOODS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

Corrections in Letters Patent No. 1,079,679.

It is hereby certified that in Letters Patent No. 1,079,679, granted November 25, 13, upon the application of John A. Wintroath, of Los Angeles, California, for an provement in "Well Mechanism," errors appear in the printed specification requir g correction as follows: Page 1, after line 78, insert the sentence *My invention ates to a novel combination to be used in deep-well pumping mechanisms.;* and page line 93, for the word "carrier" read *carrier;* and that the said Letters Patent ould be read with these corrections therein that the same may conform to the record the case in the Patent Office.

Signed and sealed this 30th day of December, A. D., 1913.

[SEAL.]

J. T NEWTON,
Acting Commissioner of Patents.

47 Mail Room,
Jul- 6, 1915,
U. S. Patent Office.

Division 9,
Jul- 8, 1915,
U. S. Patent Office.

38,254, Paper No. 1.

Petition.

To the Commissioner of Patents:

Your petitioners, Matthew T. Chapman and Mark C. Chapman, citizens of the United States, and residents of Aurora, in the County, of Kane, and State of Illinois, whose post-office addresses are c/o The American Well Works, Aurora, Illinois, pray that Letters Patent may be granted to them for the improvements in Deep Well Pumps, set forth in the annexed specification; and they hereby appoint A. H. Adams and J. L. Jackson, composing the firm of Adams and Jackson, Reg. No. 89, of the City of Chicago, State of Illinois, their attorneys, with full power of association, substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the Patent, and to transact all business in the Patent Office connected therewith.

Signed at *Aurora*, in the County of Kane, and State of *Illinois*, this *28*- day of *June*, 1915.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Revenue Stamp.

Oath.

STATE OF ILLINOIS.
County of Kane, ss:

Matthew T. Chapman, and Mark C. Chapman, being duly sworn, depose and say that they are citizens of the United States and residents of Aurora, in the County of Kane, and State of Illinois; that they verily believe themselves to be the original, first and joint inventors of the improvements in Deep Well Pumps, described and claimed in the annexed specification; that they do not know and do not believe that the same were ever known or used before their invention or discovery thereof; or patented, or described in any printed publication in any country before their invention or discovery thereof, or more than two years prior to the filing of their application, Serial No. 482,517, of which this is a division; or in public use or on sale in the United States for more than two years prior to said application; and that no application for patent for said improvements has been filed by them or their representatives or assigns in any foreign country.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

48 Subscribed and sworn to before me this *28* day of *June*, 1915.

[SEAL.] W. E. KNICKERBOCKER,
Notary Public.

Specification.

To all whom it may concern:

Be it known that we, Matthew T. Chapman and Mark C. Chapman, citizens of the United States residing at Aurora, in the County of Kane, State of Illinois, have invented certain new and useful improvements in Deep Well Pumps, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to pumps for raising water from deep wells, being a division of our application, 482,517, which was Insert A'. filed on March 10, 1909, ^ It is one of the objects A'

of our invention to provide a liquid balancing means in connection with the shaft of a rotary deep well pump by which the shaft is adapted to be raised off of its auxiliary bearings and rotatably sustained upon a film of liquid escaping between oppositely-disposed parts of our balancing mechanism. It is another object of our invention to provide an improved form of balancing mechanism in which the parts between which the sustaining film of water escapes have a flat butting engagement whereby any wear which may result in use can be compensated for by a suitable adjustment of the parts. It is another object of our invention to provide a new and improved form of coupling devices by which the several sections of the well tube and shaft casing are connected together, and suitable bearings are provided for the shaft. It is another object of our invention to provide a new and improved arrangement of well tube, shaft casing, shaft, runner, and auxiliary anti-friction bearing for the upper end of the shaft by which the shaft may be tightened and straightened relative to the shaft casing and the well tube. It is another object of our invention to improve devices of this type in sundry details hereinafter pointed out. The preferred means by which we have accomplished our several objects are illustrated in the accompanying drawings and are hereinafter specifically described. That which we believe to be new and desire to cover by this application is set forth in the claims.

In the drawings:

Fig. 1 is a view, mostly in vertical section, showing a pumping mechanism embodying our improvements;

Fig. 2 is an enlarged detail illustrating the liquid balancing means; and

Fig. 3 is an enlarged detail illustrating our improved coupling mechanism.

Referring to the several figures of the drawings in which corresponding parts are indicated by the same reference characters,—

10 indicates a standard having laterally-projecting lugs 11 on which rests a casting 12 which carries the auxiliary bearing
49 means hereinafter described for supporting the shaft 13, together with means for lubricating such bearings. The upper end of the shaft 13 is connected by means of a coupling device 14 of

any suitable type with a motor 15 supported by the standard 10. The auxiliary bearings comprise a casing 16 mounted by means of screw-threads upon the upper end of the casting 12, a set-screw 17 being provided for locking the casing 16 in the desired adjusted position relative to the casting 12. The casing 16 supports an anti-friction bearing 18 of any suitable type, which underlies a collar 19 adjustably fixed by means of set screws upon the shaft 13. An anti-friction bearing 20 is mounted upon the shaft 13 below the casting 12, a collar 21 being adjustably mounted upon the shaft 13 in engagement with the bearing 20, the arrangement being such that the bearing 20 is adapted to receive any upward thrust upon the shaft 13. The construction comprises ducts 22-23 leading from one to the other of the bearings 18-20, together with means for causing a circulation of a suitable lubricant therethrough, but inasmuch as such lubricating means forms no part of our present invention it is not believed to be necessary to describe it in detail herein.

24 indicates a base-plate from which the standard 10 rises, such base-plate being provided with the central opening. The upper section 25 of the well tube is secured in any suitable manner to the base-plate 24 below the central opening therethrough, and an elbow discharge-member 26 is connected in any suitable manner above the plate 24 so as to form a continuation of the well tube 25. The elbow outlet-member 26 is provided with an upwardly-extending sleeve 27 upon which is mounted in any suitable manner the lower member 28 of a casing hereinafter more particularly described. To the casing member 28 is connected by means of screw-threads or in any other suitable manner the upper end of the uppermost shaft casing section 29 which extends downward through the sleeve 27 and through the well tube 25 about the shaft 13.

Our improved coupling means for coupling together the several sections of the well tubing and the shaft casing comprises a spider 30 provided with an annular ring portion 31 extending between the adjacent ends of the well tube sections 25. Each section 25 of the well tube is provided with a collar 32 mounted thereon by means of screw-threads, the collar 32 and the ring 31 of the spider 30 being tightly connected together by means of a plurality of bolts 33. The spider 30 also comprises arms 34 extending from the annular portion 31 to the hub portion 35, the outer ends of the arms 34 being bevelled as shown in Fig. 3 so as to guide the spider into centered position relative to the lowermost one of the two connected well tube sections 25. The hub 35 of the spider is provided with a lining 36 of babbitt metal, or other suitable material, forming a bearing for the bearing sleeve 37 mounted upon the shaft 13, the sleeve 37 being held in position upon the shaft 13 by means of a pin 38. The adjacent sections of shafting 13 are connected together by means of a coupling 39 of any suitable type.

Mounted upon the lower end of the shaft 13 is a plurality of runners or propellers 40 of any suitable type adapted to operate in suitable pump casings 41, also of any suitable type. Below the lowermost runner 40 there is provided a bearing 42

adapted to hold the shaft 13 against lateral movement, such bearing being enclosed in a suitable

housing 43. The shaft casing 29 is provided with a number of openings 44 therein at its lower end covered by a wire netting 45. Inasmuch as the runners, the pump casings, the bearing and the lower end of the lowermost section of casing 29 are formed and operate in precisely the manner set forth in the patent, No. 1,149,633, above referred to Per A. ∧ [our said application, 482,517,],* it is believed to be unnecessary to further describe them herein. A pipe 46 is provided communicating with the uppermost section of shaft casing 29 for the purpose of supplying water to the shaft casing for lubricating the bearings of the shaft before starting the pump in operation, as set forth in our patent Per A. said ∧ [application].*

Our improved liquid balancing means comprises a casing member 47 supported by the casing member 28, the casing member 47 being provided with a downward extension 48 adapted to have suitable packing means placed therein about the shaft 13, such packing to be held in position by an adjustable gland 49. A plate 50 adjustably fixed upon the shaft 13 overlies the upper edge of the casing 47, having a stepped engagement with the said casing. A casing member 51 cooperates with the casing member 28 to enclose the plate 50 and the casing member 47. An outlet pipe 52 leads from one side of the casing 28-51. An inlet pipe 53 communicates with a duct 54 formed in the wall of the casing member 28 communicating through a suitable opening in the bottom of the casing 47. The arrangement is such that water under pressure admitted through the pipe 53 from any suitable source of supply presses upward on the plate or piston 50. When the pressure within the casing 47 reaches a certain maximum, the plate or piston 50 with the connected shaft 13 will be raised slightly so as to permit a film of water to escape between the upper edge of the casing 47 and the engaging face of the said plate or piston, the pump shaft being caused thus to rotate on a film of water, materially reducing the friction and improving the operation of the pump.

What we claim as our invention and desire to cover by Letters Patent, is:

51 Per A.

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1. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth, and rotary impeller means in said casing, of a downwardly-extending power shaft having such length that the shaft would

[*Words and figures enclosed in brackets erased in copy.]

buckle seriously if supported from below, said shaft being driven from above and being adapted to drive said impeller means, a fluid-operated bearing co-operating to support said shaft, said fluid-operated bearing being located substantially at the top of said long shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, and means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means.

[Matter enclosed between rules erased in copy.]

1A [2].* In a deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft driven from above and extending downward to said impeller, said power shaft being adapted to transmit power to said impeller, a fluid operated bearing located substantially at the top of said power shaft for supporting said shaft and impeller on a fluid surface, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, and auxiliary bearing means for sustaining any resultant downward thrust of said power shaft.

2A [3].* In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a long downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing co-operating to support said long shaft, auxiliary bearing means for sustaining any resultant downward thrust on said shaft, said fluid operated bearing and said auxiliary bearing means both being located substantially at the top of said power shaft so that the long shaft depends therefrom and by its own weight tends to draw itself into a substantially straight vertical line, and means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means.

3A [4].* In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, auxiliary bearing means for sustaining any resultant downward thrust of said power shaft and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft.

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[* Words and figures enclosed in brackets erased in copy.]

Per A.

5. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft and said fluid operated bearing having play so that the fluid bearing may accommodate itself to shifting of the shaft axis, and means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means.

[Matter enclosed between rules erased in copy.]

Per B.

4A [6].* In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, said pump-shaft being adjustable vertically, a water-pressure-operated governor at the upper end portion of said pump-shaft for supporting and adjusting the same, and a bearing at the lower end portion of said pump-shaft.

[Matter enclosed between rules erased in copy.]

Per A.

7. In a deep well pumping mechanism, the combination of a downwardly-extending power-shaft, pumping means carried thereby, said shaft being driven from above, and a fluid-operated bearing located near the top of said shaft, said shaft being suspended from said bearing.

8. In a deep well pumping mechanism, the combination of a downwardly-extending power-shaft, pumping means carried thereby, said shaft being driven from above, a fluid-operated bearing located near the top of said shaft, said shaft being suspended from said bearing, and means for supplying fluid under pressure to said bearing.

53 9. The combination with a well-casing, of a rotary pump located therein below the surface of the earth, said pump comprising a power-shaft driven from the top, and a liquid-operated bearing located at the surface, said bearing supporting the weight of said shaft.

[* Words and figures enclosed in brackets erased in copy.]

10. In a deep well pumping mechanism, the combination of a well tube, a shaft extending downward in said well tube, a runner adapted to be rotated by said shaft for forcing liquid upward through said well tube, and a liquid balancing means adapted to receive the downward thrust of the shaft, said liquid balancing means comprising an annual casing member surrounding said shaft, means for supplying liquid under pressure to said casing, and a plate fixed on said shaft overlying the upper edge of said casing whereby the shaft is adapted to rotate on a film of liquid escaping between the edge of the casing and the plate as the plate and shaft are raised relative to the casing by the pressure of the liquid in said casing.

[Matter enclosed between rules erased in copy.]

Per B.

5[A] [11].* In a deep well pumping mechanism, the combination of a well tube, a shaft extending downward in said well tube, a runner adapted to be rotated by said shaft for forcing liquid upward through said well tube, and a liquid balancing means adapted to receive the downward thrust of the shaft, said liquid balancing means comprising an annular casing member surrounding said shaft, and provided with a downwardly-projecting central extension adapted to receive a suitable packing, a gland closing the upper end of said extension, means for supplying liquid under pressure to said casing, and a plate fixed on said shaft overlying the upper edge of said casing whereby the shaft is adapted to rotate on a film of liquid escaping between the edge of the casing and the plate as the plate and shaft are raised relative to the casing by the pressure of the liquid in said casing.

[Matter enclosed between rules erased in copy.]

4[B] [6[A], 12].* In a deep well pumping mechanism, the combination of a well tube, a shaft extending downward in said well tube, a runner adapted to be rotated by said shaft for forcing liquid upward through said well tube, and a liquid balancing means adapted to receive the downward thrust of the shaft, said liquid balancing means comprising an annular casing member surrounding said shaft, means for supplying liquid under pressure to said casing, and a plate fixed on said shaft having a stepped bearing edge overlaying the upper edge of said casing whereby the shaft is adapted to rotate on a film of liquid escaping between the edge of the casing and the stepped edge of the plate as the plate and shaft are raised relative to the casing by the pressure of the liquid in said casing.

[* Words and figures enclosed in brackets erased in copy.]

54 Per A.

13. In a deep well pumping mechanism, the combination of a well tube, a shaft extending downward in said well tube, a runner adapted to be rotated by said shaft for forcing liquid upward through said well tube, and a liquid balancing means adapted to receive the downward thrust of the shaft, said liquid balancing means comprising an annular casing member surrounding said shaft, means for supplying liquid under pressure to said casing, a plate fixed on said shaft overlying the upper edge of said casing whereby the shaft is adapted to rotate on a film of liquid escaping between the edge of the casing and the plate as the plate and shaft are raised relative to the casing by the pressure of the liquid in said casing, a second casing surrounding said first-named casing and closure plate, and a drain pipe leading from said second casing.

[Matter enclosed between rules erased in copy.]

5[b] [7[a], 14].* In a deep-well pump, the combination of a well-tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well tube, a plurality of sleeve sections enclosing said shaft, and a coupling device coupling the several sections of the well tube and said sleeve sections, said coupling device comprising a spider upon which said sleeves are screwed, said spider projecting between the adjacent ends of adjoining sections of the well-tube, and coupling-rings outside of the well tube and secured to the spider at opposite sides of the projecting portion thereof for securing the sections of the well tube thereto.

6[b] [8[a], 15].* In a deep well pump, the combination of a well tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well tube, a plurality of sleeve sections enclosing said shaft, a coupling device coupling the several sections of the well tube and said sleeve sections, said coupling device comprising a spider having a screw-threaded connection with said sleeves, said spider projecting between the adjacent ends of adjoining sections of the well tube, coupling-rings screwed upon the outside of the sections of well tube respectively, means for securing said coupling-rings to the annular projecting portion of said spider, and a bearing carried by said spider for said shaft.

7[b] [9[a], 16].* In a deep well pump, the combination of a well tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well tube, a plurality of sleeve sections enclosing said shaft, and a coupling device coupling the several sections of the well tube and said sleeve sections, said coupling devices comprising a spider having a tapered centering seat upon one of said sections of well-tube, said sleeve being screwed upon said spider, said spider pro-

[* Words and figures enclosed in brackets erased in copy.]

jecting between the adjacent ends of adjoining sections of the well tube, coupling-rings screwed upon the outside of the sections
55 of well tube respectively and means for securing said coupling-rings to the annular projecting portion of said spider.

Per A.

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7. In a pump, the combination of a well tube, a shaft extending downward therein, a shaft casing about said shaft within said well tube, means for holding the lower end of said shaft casing in fixed position relative to said well tube, a runner adapted to be rotated by said shaft, means serving to hold the lower end of said shaft down relative to said shaft casing, and means for adjusting the upper end of said shaft vertically relative to said casing for tightening and straightening the shaft in said casing.

18. In a pump, the combination of a well tube, a shaft extending downward therein, a shaft casing about said shaft within said well tube, means for holding the lower end of said shaft casing in fixed position relative to said well tube, a runner adapted to be rotated by said shaft, means serving to hold the lower end of said shaft down relative to said shaft casing, means for adjusting the upper end of said shaft vertically relative to said casing for tightening and straightening the shaft in said casing, and bearings along said casing adapted to hold said shaft in spaced relation relative to said casing.

19. In a pump, the combination of a well tube, a shaft extending downward therein, a shaft casing about said shaft within said well tube, means for holding the lower end of said shaft casing in fixed position relative to said well tube, a bearing for said shaft held in fixed position relative to said well tube, a runner fixedly mounted on said shaft below said bearing adapted to hold the lower end of the shaft downward relative to the well tube and the shaft casing, and means for adjusting the upper end of said shaft vertically relative to said casing for tightening and straightening the shaft in said casing.

[Matter enclosed between rules erased in copy.]

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Paper No. 2.

January 27, 1916.

Adams & Jackson, Monadnock Block, Chicago, Ill.:

Chapman & Chapman. For Deep Well Pumps. Filed July 6, 1915. Ser. No. 38,254.

This application has been examined.

This case is one of those to which the Commissioner's Order No. 2210, of June 28, 1915, is directed and under which order any action

56 on behalf of the applicants which does not put the application in condition for allowance or final rejection must be submitted to a Law Examiner for his approval of its entry.

The application referred to in lines 8 and 9 of page 1 and line 6 of page 5 having become patent No. 1,149,633, granted Aug. 10, 1915, the data of the patent should be substituted for or added to the data of the application.

Claims 1, 7, 8, and 9 are rejected on either Snow, #669,601, Mar. 12, 1901, Class 64-47 (Pumps, Open Screw), or the rotary well pump provided with a fluid thrust bearing shown in the plates interposed between pages 10 and 11 of the 23rd Annual Report of the Board of Water Commissioners of the City of Madison, Wisconsin, for the year ending Sept. 30, 1905, Wisconsin Botschafter Print, Madison, Wis., 1906. Copies of these reports including the one cited are on file at the John Crerar Library, Chicago, Ill., or a copy of the report cited may be seen in Division 9 of this office.

The feature defined in claim 5, lines 8 and 9, by the expression "said fluid operated bearing having play so that the fluid bearing may accommodate itself to shifting of the shaft axis" is not seen to be supported by the description or the showing in the drawing or within the original disclosure. The claim is otherwise held not patentable over either Snow or the Madison Report, both cited above.

Claim 6 is rejected on Snow above cited in view of the tail bearing below the impeller as shown in either Alvord, #735,692, Aug. 11, 1903, Class 253-199, or Ivens, #682,939, Sept. 17, 1901, Pumps, Rotary Single Piston (Cent. Deep Well).

Claims 10 to 13 are rejected on the showing in the Madison Report above cited, it not being seen that claims 11 and 12, which define the extension to plate 50, state anything requiring invention over the reference.

Claims 14, 15, and 16 are rejected on the ground that they distinguish from the combined coupling and shaft bearing member shown in Fig. 1 of Ellis, #819,986, May 8, 1906, Pumps, Rotary Single Piston (Cent. Deep Well), in view of the coupling of Bowers, #442,947, Dec. 16, 1890, Class 137-28, and the element *d* of Wiesenbach, #669,209, Mar. 5, 1901, Machine Elements, Cranks & Wrist Pins (Pumps, Elements, Operating Devices), only by a definition of features involving nothing more than mechanical skill and not requiring invention.

Claims 17, 18, and 19 are clearly met in Layne, #957,974, May 17, 1910, Class 253-199, attention being also called to Layne Reis. #13,467, Sept. 24, 1912, same class.

Claims 2, 3, and 4 are deemed allowable subject to a possible interference with the patent to Wintroath, #1,079,679, Nov. 25, 1913, Pumps, Rotary Single Piston (Cent.).

As further showing the state of the art attention is called to

Jackson, #986,827, Mar. 14, 1911. Class 253-199;

Stumpf, 783,153, Feb. 21, 1905, (Class 121, Rot. Imp. Com. (Pumps, Rotary, Cent.).

F. M. TRYON, *Ex.*

F. W. B.

57 Mail Room,
Feb. 7, 1916,
U. S. Patent Office.

Division 9,
Feb. 8, 1916,
U. S. Patent Office.

Paper No. 3.

Amendment.

A.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pumps. Filed July 6, 1915. Serial No. 38,254.

Feb. 5, 1916.

Hon. Commissioner of Patents.

SIR: In response to Office letter of January 27, 1916, we hereby amend as follows:—

Page 1, line 17 from the bottom of the page, change the period after "1909" to a comma and insert

A'. upon which application patent No. 1,149,633, was granted on August 10, 1915.

Page 5, line 6, cancel "our said application, 482,517," and insert —the patent, No. 1,149,633, above referred to,—

Page 5, line 12, cancel "application" and insert —patent—

Cancel claim 1, claim 5, claims 7, 8, 9 and 10, claim 13, and claims 17, 18 and 19, and change the numerals of the remaining claims accordingly.

In view of the foregoing amendments reconsideration and an allowance of this application are respectfully requested. The formal corrections noted by the Office have been taken care of.

It is believed that claim 6 is fairly allowable over the references cited against it. It is true that the Snow patent discloses the use of a number of the elements covered by claim 6. The Alvord patent, and the Ivens patent both disclose the use of a tail-bearing for the shaft of a rotary pump. But there is no suggestion in either the Ivens or the Alvord patent that the tail-bearing disclosed could be used with the construction shown by Snow. It is believed there is

sufficient cooperation between the fluid thrust-bearing and the
58 tail-bearing to warrant a holding that the claim in question covers a true combination rather than a mere aggregation, the fluid thrust-bearing and the tail-bearing being used cooperatively for the proper control of the same pump-shaft. In the absence of any citation showing or suggesting the combination called for, it is believed that there is warrant for an allowance of a claim covering such novel combination in view of the more perfect and more complete control of the shaft by the use of such structure. It is believed that upon reconsideration this claim will be seen to be allowable.

Former claims 11 and 12 (now claims 5 and 6) are believed to be sufficiently differentiated from the references to warrant their allowance. These claims are restricted quite closely to the detailed construction disclosed by applicants, and it is believed that the Office would not be doing violence to the interests of any one by an allowance of the detailed claims in question. In reading former claims 10 and 13 upon the structure of the Madison report, it was necessary to consider the lower one of the two brass plates of the thrust-bearing as comprising an annular casing surrounding the shaft. In view of the fact that such brass plate apparently subserves the same purpose, generally speaking, as does the casing 47 of applicants, it is believed that such an interpretation of the claims is probably not far-fetched, but it is believed that the Office should not go the step or steps further required for holding the said brass plate of the structure of the Madison report as the equivalent of the particular construction claimed more in detail in former claims 11 and 12. In view of the fact that the structures set forth in claims 11 and 12 are not shown by the citation either in the precise form or in a form only colorably different, it is believed that former claims 11 and 12 should be allowed.

An allowance of former claims 14, 15 and 16 is also requested. No one of the references cited by the Office shows the combination of these claims. It may seem that the changes made by applicants are trifling and of no especial merit, but we believe any such impression is erroneous. It is not believed that the Wiesenbach patent is of any special pertinence. It was cited, we presume, in view of its disclosure of a plate *d* extending across between two flanged cylindrical parts *n-n*. It will be conceded that if the Bowers construction had the plate *d* of Wiesenbach with its shaft-bearing substituted in place of the packing-ring *d* of Bowers, such supposed construction would be similar in several respects to the structure covered by these claims. The supposed structure would not, however, in any event meet the terms of the claims in question. Even if the structure of the supposed combination of Bowers and Wiesenbach were then provided with the casing or sleeve members 9 of the Ellis patent construction and the small coupling sleeves used in connection with such casing members 9, even then the resulting structure would not be such as to enable the claims to be read strictly thereon. In view of the fact that it is by no means clear that an adaptation of the devices of the

three patents to each other could be effected without the exercise of the inventive faculty, and in view of the further fact that even if such combination were effected, as above suggested, the claims
59 could not then be read in terms upon the resulting structure, it is believed that the objection to the claims should be withdrawn.

It is believed that the differences between applicants' structure, as set forth in these claims, and the structure of the Ellis patent, which is the only one of the three references which is directed toward similar subject-matter, are such, as viewed from a practical standpoint, as to form the basis for allowable claims. Referring to Fig. 1 of the Ellis patent it will be clear that, in assembling the pumping mechanism for lowering it into a well, the lowermost section 9 will be held stationary relative to the corresponding section 1 of the well-tube. The coupling member 10^b would then be secured in position upon the upper end of the casing member 9, and the coupling-sleeve 12 would presumably be secured in position about the member 10 and upon the upper end of the casing member 1. The sleeve 12, however, would have no tendency to draw the spider 10 into close union with the member 1, by reason of the fact that the spider 10 is held against rotation relative to the section 1. The casing section 9 can readily be secured to the upper end of the hub of the spider 10, and the upper well-tube section 1 can be tightened into contact relative to the spider 10. It is just possible that the operation of assembling might be so worked out as to enable the spider 10 to be tightened upon the upper end of the lower well-tube section 1, if sufficient care be taken in timing one portion of the operation relative to the remaining portions, but it is clear that if this result is attainable at all it is attainable only by the use of considerable care.

In the use of applicants' coupling, on the contrary, no such difficulty is encountered. With a sleeve 32 in position [with the sleeve 12 in position]* on the upper end of a lower well-tube section 25, the spider 30 can be screwed into the upper end of a lower casing section 29. The upper casing section 29 can then very readily be screwed into position, and the upper well-tube section 25, with a sleeve 32 secured thereon, can easily and quickly be secured by means of the bolts 33 rigidly in position, there being no difficulty whatever in making the joint between the sections 25 and the spider 30 as tight as may be desired.

The above explanation sets forth merely one of the disadvantages characteristic of one of the prior devices as compared with applicants' construction, but it is believed to be sufficient to demonstrate that the different constructions in question are by no means mechanical equivalents of each other and to call attention to the fact that there are a considerable number of elements to be taken into consideration in the organization and arrangement of a coupling device of this

[*Words and figures enclosed in brackets erased in copy.]

pe. It would seem therefore that the position of the Office that ly mechanical skill was involved in the production of the subject-atter of former claims 14, 15 and 16 should not be insisted on.
Favorable action is very respectfully requested.

Respectfully,

ADAMS & JACKSON,
Attorneys for Applicants.

Paper No. 4.

February 12, 1916.

lams & Jackson, Monadnock Block, Chicago, Ill.:

apman & Chapman. For Deep Well Pumps. Filed July 6, 1915. Ser. No. 38,254.

This application has been considered as amended Feb. 7, 1916.
Claim 4 is rejected on Alvord, #735,691, Aug. 11, 1903, Class 3-179, in view of Snow of record. Alvord discloses a pumping echanism having a water-pressure operated governor above the mp impeller and provided with a bearing at the lower end portion the pump shaft. In view of Snow it is held that it did not require vention to place the pressure governor at the upper end portion of e pump shaft.
Claim 5 is rejected on the showing in the plates interposed between ges 10 and 11 of the Madison report of record. A careful inspec-n of this showing discloses all the elements stated in claim 5 with e exception of an adjustable gland stuffing-box, and to apply this atture, which with its function is well known, it is held did not in-lve invention.
Claims 6 to 9 inclusive may be allowed as at present advised.
Claims 1, 2, and 3 stand allowed.

F. M. TRYON, *Ex.*

F. W. B.

Mail Room,
Feb. 28, 1916,
U. S. Patent Office

Division 9,
Feb. 29, 1916,
U. S. Patent Office.

Paper No. 5.

Amendment.

United States Patent Office.

Div. 9, Room 142.

B.

In the Matter of the Application of Chapman & Chapman. Deep Well Pumps. Filed July 6, 1915. Ser. No. 38,254.

Feb. 26, 1916.

Hon. Commissioner of Patents.

SIR: In response to Office letter of Feb. 12, *1916, we hereby amend by cancelling claims 4 and 5 and renumbering the remaining claims accordingly.*

61 Inasmuch as the above amendment meets fully the requirements of the Office letter, a prompt allowance is very respectfully requested.

Respectfully,

ADAMS & JACKSON,
Attorneys for the Applicants.

Paper No. *1.*

Mar. 14, 1916.

March 21, 1916.

Adams & Jackson, Monadnock Block, Chicago, Ill.:

Application of Matthew T. & Mark C. Chapman for Deep Well Pumps. Filed July 6, 1915. Ser. No. 38,254.

39,684.

1. In a deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft driven from above and extending

downward to said impeller, said power shaft being adapted to transmit power to said impeller, a fluid operated bearing located substantially at the top of said power shaft for supporting said shaft and impeller on a fluid surface, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means,

and auxiliary bearing means for sustaining any resultant downward thrust of said power shaft.

2. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a long downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said long shaft, auxiliary bearing means for sustaining any resultant downward thrust on said shaft, said fluid operated bearing and said auxiliary bearing means both being located substantially at the top of said power shaft so that the long shaft depends therefrom and by its own weight tends to draw itself into substantially straight vertical line, and means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means.

3. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, means for supplying fluid under pressure to said fluid bearing independently of the action *of the action* of the pump means, auxiliary bearing means for sustaining any
62 resultant downward thrust of said power shaft and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft.

The interference involves your application above identified and a patent for "Well Mechanism," granted to John A. Wintroath, of 900 Santa Fe Ave., Los Angeles, Cal., Nov. 25, 1913, No. 1,079,679, application filed Dec. 2, 1912, Ser. No. 734,649, attorney of record Jas. R. Townsend, of San Fernando Bldg., Los Angeles, Cal., assignee Layne & Bowler Corporation, of Los Angeles, Cal.

The relation of the counts of the interference to the claims of the respective parties is as follows:

Counts.	Chapman & Chapman.	Wintroath.
1	1	2
2	2	3
3	3	4

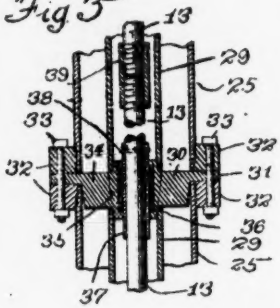
P. D. HASKELL,
Acting Ex.

F. W. B.

Fly S. W. 11 31254

456
Chapman
v.
Wintroath
} $62\frac{1}{2}$

Fig. 3



60
9

Fig. 1

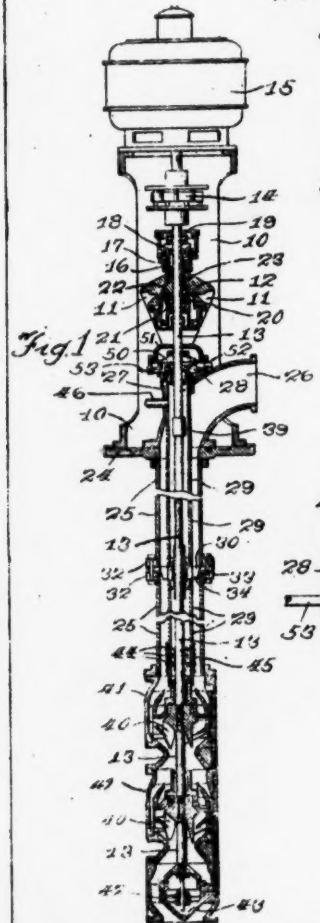
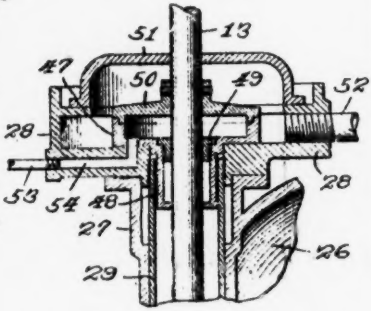


Fig. 2



Inventors.
Matthew J. Chapman.
Mina C. Chapman.
Adams & Pearson.
Attys

By

No 1132, Patent appeal docket. 78 92
Wintroath
v.
Pp. 92

62 1/2

2-251.

Room No. 142.

Address only "The Commissioner of Patents, Washington, D. C."

Letter No. —.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., March 11, 1916.

Examiner of Interferences:

An interference is found to exist between the following cases, and in respect to the invention therein specified, to wit:

Cases.

1. Name, Matthew T. & Mark C. Chapman.
Post-office addresses, care The American Well Works, Aurora, Ill.
Title, Deep Well Pumps.
Filed July 6, 1915. Ser. No. 38,254. Pat'd —— —, ——. No. —. Div. of 482,517, filed Mar. 10, 1909.
Attorneys, Adams & Jackson, of Monadnock Block, Chicago, Ill.
Associate att'y, —— ——, of ——.
Assignee, The American Well Works, of Aurora, Ill.

(Here follows diagram marked page 62½.)

63 2. Name, John A. Wintroath.
Post-office address, 900 Santa Fe Ave., Los Angeles, Cal.
Title, Well Mechanism.
Filed Dec. 2, 1912. Ser. No. 734,649. Pat'd Nov. 25, 1913. No. 1,079,679.
Attorney, Jas. R. Townsend, of San Fernando Bldg., Los Angeles, Cal.
Associate att'y, Robert A. Steps, of Washington, D. C.
Assignee, Layne & Bowler Corporation, of Los Angeles, Cal.

3. Name, —— ——.
Post-office address, ——.
Title, ——.
Filed —— —, ——. Ser. No. —. Pat'd —— —, ——. No. —.
Attorney, —— ——, of ——.
Associate att'y, —— ——, of ——.
Assignee, —— ——, of ——.

Intf. Number 39,684.
Intf. Declared Mar. 21, 1916.
Statements Due May 1, 1916.

Invention.

1. In a deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft driven from above and extending downward to said impeller, said power shaft being adapted to transmit power to said impeller, a fluid operated bearing located substantially at the top of said power shaft for supporting said shaft and impeller on a fluid surface, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, and auxiliary bearing means for sustaining any resultant downward thrust of said power shaft.

2. In a deep well pumping mechanism, the combination with pump means including pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a long downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said long shaft, auxiliary bearing means for sustaining any resultant downward thrust on said shaft, said fluid operated bearing and said auxiliary bearing means both being located substantially at the top of said power shaft so that the long shaft depends therefrom and by its own weight tends to draw itself into a substantially straight vertical line, and means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means.

3. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperatively to support said shaft, said fluid operated bearing being located substantially
64 at the top of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, auxiliary bearing means for sustaining any resultant downward thrust of said power shaft and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft.

The relation of the counts of the interference to the claims of the respective parties is as follows:—

Counts.	Chapman & Chapman.	Wintroath.
1	1	2
2	2	3
3	3	4

Claims 2, 3, and 4 of Wintroath define the same invention as Chapman & Chapman's claims 1, 2, and 3 in substance.

P. D. HASKELL,
Acting Ex'r.

Counts compared.
F. H. B.

39,684—5.

Statement of Wintroath.

Filed Apr. 27, 1916.

Approved May 5, 1916.

W.

In the United States Patent Office.

Patent to John A. Wintroath for Well Mechanism. Issued Nov. 25, 1913. No. 1,079,679. Original Application Filed December 2, 1912. Serial Number 734,649.

To the Commissioner of Patents.

HONORABLE SIR:

In re Interference in the United States Patent Office.

Preliminary Statement of John A. Wintroath.

MATTHEW T. & MARK C. CHAPMAN

vs.

JOHN A. WINTROATH.

STATE OF COLUMBIA,
County of Los Angeles, ss:

John A. Wintroath, of the City of Los Angeles, in the County of Los Angeles, State of California, being first duly sworn [ed].* doth depose and say, that he is a party to the interference declared by the Commissioner of Patents on March 21, 1916, between the pending application for letters patent of Matthew T. and Mark C. Chapman and the patent previously granted to this affiant on November 25, 1913, numbered 1,079,679, for "Well Mechanism";

65

That he conceived the invention contained in the claims of his said patent declared to be involved in this interference, on or about the first day of October 1910; that on or about the second day of January 1912 he first made drawings embodying the said invention; that he never made a written description of the said invention prior to writing the application upon which the said patent was granted; that on or about the second day of January 1912 he first explained the invention to others; that he first embodied his invention in a full sized completed machine on or about the seventeenth day of May 1912 and that on or about the thirtieth day of May 1912, the said

[*Words and figures enclosed in brackets erased in copy.]

machine, namely a Deep Well Turbine Pump, was first successfully operated in the town of San Dimas, County of Los Angeles, State of California;

That [ever]* since the said machine was first successfully operated at San Dimas, California, on May 30, 1912, as stated, this affiant, and his assignees, the Layne & Bowler Corporation, have made and constructed many other machines,—approximately 42 or 43 in number—embodying the affiant's invention, and have successfully operated the same in many parts of the United States, and that the said machines embodying his said invention have been in open, notorious, and continual public use, ever since May 30th, 1912, at San Dimas, California, and many other places. That the machines in which affiant's invention is used, are Deep Well Centrifugal Turbine Pumps, and that such pumps have an extensive application in irrigating arid and semi-arid lands, and in [the]* developing water for Cities, Railroads, and Sugar Factories, and for other industrial and governmental enterprises. That the affiant's invention has made possible a substantial extension in the field of such Deep Well Pumps, and that the cost of each pump embodying this invention is approximately $3,000.00, so that the 40 pumps, more or less, which this affiant, and his assignees, have manufactured, embracing this invention, are valued at approximately $120,000.00, and that the development undertaken by the purchasers and users of these pumps has been materially expedited and encouraged by the application of such Turbine Centrifugal Pumps to their problems, and that such [such]* pumps could not have been so used except for affiant's invention, and that the other machinery previously used is less satisfactory in efficiency, servicibility and dependcibility.

JOHN A. WINTROATH.

Subscribed and sworn to before me this 21 day of April, 1916.

[SEAL.] HANNAH McKERNAN,
Notary Public in and for the County of Los Angeles, State of California.

66 Paper No. 7.

May 5, 1916.

Interference No. 39,684.

WINTROATH

v.

CHAPMAN AND CHAPMAN.

The date of conception of the invention in issue alleged in the preliminary statement of Wintroath, the junior party, being subsequent to the filing date of the senior party, notice is hereby given that judgment on the record will be entered against said junior

[*Words and figures enclosed in brackets erased in copy.]

party unless he shall within thirty days show good and sufficient cause why such action should not be taken.

The dates of filing and serial numbers of the respective applications are as follows:

John A. Wintroath, filed Dec. 2, 1912, No. 734,649, patented Nov. 25, 1913, No. 1,079,679.

Matthew T. and Mark C. Chapman, filed July 6, 1915, No. 38,254, division of No. 482,517, filed March 10, 1909.

H. E. STAUFFER,
Examiner of Interferences.

Mail Room,
Jun- 3, 1916,
U. S. Patent Office.

Docket Clerk,
Jun- 3, 1916,
U. S. Patent Office.

39,684—10.

In the United States Patent Office.

Before the Examiner of Interferences.

Interference #39,684.

WINTROATH

vs.

CHAPMAN et al.

Motion to Shift the Burden of Proof.

Now comes the party Wintroath, by his attorneys, and moves to shift the burden of proof for the following reasons:

1st. That the party Chapman is not entitled to the date of his original application for reduction to practice, because he did not have the invention set forth in the counts nor did he at any time claim the invention until the filing of his divisional application involved in this interference, which application was filed
67 three years after the party Wintroath had actually reduced the invention to practice and placed the same on the market, and a year and a half after the party Wintroath's patent had issued.

2nd. That the party Chapman cannot set up his original application as constituting a constructive reduction to practice of matter shown but not claimed therein, but for the purposes of this motion must be limited to the date of his divisional application here in issue.

3rd. That, as between a mere paper disclosure in which there is no claim to the invention of the counts and a patent issued in regular order according to the rules of practice of the Patent Office, the burden of proof is upon the party seeking to defeat the established prima facie right of the patentee.

And furthermore, the party Wintroath requests a stay of proceedings until determination of this motion and requests that the

Examiner of Interferences decide this motion before transmitting the files and the motion to dissolve to the Law Examiner.

JOHN A. WINTROATH AND
LAYNE & BOWLER CORPORATION,
By SYNNESTVEDT & BRADLEY, *Attorneys.*

In the United States Patent Office.

Before the Examiner of Interferences.

Interference #39,684.

WINTROATH
vs.
CHAPMAN et al.

Affidavit.

STATE OF PENNSYLVANIA,
County of Philadelphia, ss:

Archworth Martin, being duly sworn, deposes and says that he is employed in the office of Synnestvedt, Bradley, Lechner & Fowkes; that on June 2nd, 1916 he sent by registered mail to Messrs. Adams & Jackson, Monadnock Block, Chicago, Ill., Attorneys for Chapman, et al., a copy of the attached Motion to Shift the Burden of Proof.

ARCHWORTH MARTIN.

Subscribed and sworn to before me this 2nd day of June, 1916.
[SEAL.] ELEANOR L. JAQUETTE,
Notary Public, *Notary Public.*

Commission Expires Feb. 21st, 1919.

68 Mail Room,
Jun- 3, 1916,
U. S. Patent Office.

Docket Clerk,
Jun- 3, 1916,
U. S. Patent Office.

39,684—11.

In the United States Patent Office.

Before the Law Examiner.

Interference #39,684.

WINTROATH
vs.
CHAPMAN et al.

Motion to Dissolve.

And now comes the party Wintroath, by his attorneys, and moves to dissolve this interference on the following grounds:

1st. That the party Chapman has no right to make the claims.

2nd. That the counts are not patentable to the party Chapman because he abandoned the invention therein set forth.

3rd. That the counts are unpatentable over the following prior art patents and publications.

#517,529, April 3, 1894, Price.

#669,601, March 12, 1901, Snow.

#611,472, Sept. 25, 1898, Gillespie.

23rd Annual Report of the Board of Water Commissioners of the City of Madison, Wis., for the year 1905, Wisconsin Botschafter Print, Madison, Wisconsin, 1906. (Copies on file at John Crerar Library, Chicago, Ill., and in Division 9 of the Patent Office.

Low & Bevis Manual of Machine Drawing and Design, Edition 1905, pages 129, 130, 131. Published by Longmans, Green & Co., London, Eng., and New York, N. Y.

Price, 517,529.

This patent shows centrifugal pump mechanism for use in deep or shallow well pumps and its comprises a pump casing located beneath the surface of the earth; a rotary impeller means B in the casing, a downwardly extending power shaft C, said shaft being driven from above by a driving impeller means; a fluid operated bearing (parts G. H. Q. etc.) located at the top of the well (see Figure 5 and description thereof on Page 1 and also lines 93 to 102, page 2); and an auxiliary bearing means (parts I) for sustaining any resultant downwardly thrust of the power shaft. In the drawings the parts I are also so arranged as to take upward thrust. The fluid operated bearing piston G is lifted upward by water pressure and the range of movement is determined by the cock L.

69 Snow, 669,601.

This patent shows a fluid operated bearing for centrifugal pumps for deep or shallow wells; said fluid operated bearing being located at the top of the well and serving to support a downwardly extending power shaft 2 which operates the impeller 5 in the well casing 4. Means separate from, and in addition to, the pump are provided for supplying the fluid pressure for operating the fluid bearing and there is a bearing block 10 provided in the bottom of the fluid bearing chamber for sustaining any resultant downward thrust of the power shaft 2. At the top the power shaft 2 is provided with a collar which acts as a bearing for sustaining any resultant upward thrust on the power shaft, and the said collar (not numbered) taking against a boss formed on the under face of the top of the yoke 1. The power shaft 2 in this patent, as well as the power shaft C in the Price patent, may be of such length as to draw itself into a substantially vertical straight line by its own weight.

Thus the Snow patent shows a combination of elements identical with the counts at issue and designed to secure the same operative results.

It would involve no invention to provide the independent means for supplying fluid pressure shown in the Snow patent to the fluid bearing mechanism of the Price patent 517,529.

Gillespie, 611,472.

This patent shows a ball bearing 7 for taking the upward thrust of the shaft 1 and a ball bearing 9 which takes the downward thrust of said shaft, the shaft being utilized to operate a sluice gate. This patent shows that it is old to provide frictionless bearings to take upward and downward thrust in an analogous mechanism and no invention would be involved in substituting these frictionless bearings for the plates I of the Price patent or the block 10 and collar (not numbered) of the Snow patent hereinbefore discussed.

Madison Publication.

The 23rd Annual Report of the Water Department of the City of Madison, Wisconsin, 1905, shows a deep well pump mechanism comprising a casing, a downwardly extending power shaft adapted to operate an impeller located in said casing; a fluid operated bearing at the top of the well adapted to sustain the power shaft; an auxiliary bearing adjacent the top of the power shaft at the point where the same is coupled to the dynamo shaft, to sustain any resultant up thrust of the power shaft; and means independent of the pump mechanism for supplying fluid pressure for operating said fluid bearing. The lower half of the fluid operated bearing acts as a bearing to sustain any resultant downward thrust of the power shaft.

It would involve no invention to substitute ball bearings for the bearings shown in this publication, nor would it involve any invention to substitute the independent means for supplying fluid pressure to the fluid operated bearing shown in this publication to the construction shown in the Price patent.

Manual of Machine Drawing and Design.

This publication by D. A. Low and A. W. Bevis of 1906, on Pages 130 and 131 shows two figures 329 and 330 in which a power shaft A is supported by two cooperating bearings, the upper bearing F is a fluid pressure bearing, oil being supplied thereto under pressure through the pipe H. The lower bearing is a fluid operated bearing at the lower end of the shaft, fluid being supplied thereto under pressure, through a pipe not numbered (see Figure 330). Each bearing normally assists in sustaining the load of the shaft but the upper bearing F sustains any resultant downward thrust.

It is requested that no date for hearing on this motion be set until after a decision has been made by the Examiner of Interferences on the motion to shift the burden of proof.

JOHN A. WINTROATH AND
LAYNE & BOWLER CORPORATION,
By SYNNESTVEDT & BRADLEY, *Attorneys.*

In the United States Patent Office.

Before the Law Examiner.

Interference #39,684.

WINTROATH

vs.

CHAPMAN et al.

Affidavit.

STATE OF PENNSYLVANIA,
County of Philadelphia, ss:

Archworth Martin, being duly sworn, deposes and says that he is employed in the office of Synnestvedt, Bradley, Lechner & Fowkes; that on June 2nd, 1916, he sent by registered mail to Messrs. Adams & Jackson, Monadnock Block, Chicago, Ill., Attorneys for Chapman, et al., a copy of the attached Motion to Dissolve.

ARCHWORTH MARTIN,

Subscribed and sworn to before me this 2nd day of June, 1916.
[SEAL.] ELEANOR L. JAQUETTE,
Notary Public.

Commission Expires Feb. 21st, 1919.

71 Intf. No. 39,684, Paper No. 12.

M. S. D.

In the United States Patent Office.

Patent Interference No. 39,684.

WINTROATH

v.

CHAPMAN and CHAPMAN.

Motion for Dissolution.

Deep Well Pumps.

Order.

Patent granted John A. Wintroath Nov. 25, 1913, No. 1,079,679, on application filed Dec. 2, 1912.

Application of Matthew T. Chapman and Mark C. Chapman filed

July 6, 1915, No. 38,254, division of application filed Mar. 10, 1909.

Messrs. Synnestvedt & Bradley and Mr. Robert A. Steps for Wintroath.

Messrs. Adams & Jackson for Chapman and Chapman.

The motion to dissolve filed by Wintroath will not be set for hearing. The first and second grounds allege that Chapman has no right to make the claims and that he has abandoned the invention, but no specific reasons are stated in support of these grounds. The third ground alleges that the issue is unpatentable, but the party Wintroath, being a patentee, has no right to move to dissolve on that ground (Manson v. Hutchison, 291 O. G., 569).

THOMAS EWING,
Commissioner.

June 6, 1916.

72 Docket Clerk,
Jun- 21, 1916,
U. S. Patent Office.

39,684—18.

In the United States Patent Office.

Before the Examiner of Interferences.

Interference #39,684.

WINTROATH

vs.

CHAPMAN & CHAPMAN.

Motion for Judgment on the Record.

And now comes the party Wintroath and moves that judgment on the record be awarded against the parties Chapman & Chapman, for the reason that Chapman & Chapman are estopped from making the claims, and the facts which raise the estoppel also work an abandonment, and to award the claims to Chapman & Chapman would, under the facts, be against public policy.

The facts out of which the estoppel and abandonment arise are as follows:

The parties Chapman on March 10, 1909, filed an application which they rely on as disclosing the subject matter in issue, but made no claim to the same. Wintroath filed his application on December 2, 1912, and a patent was regularly and lawfully issued to him under the rules of the Patent Office, on November 25, 1913. On July 6, 1915, or a year and 6 months after the issuance of Wintroath's patent, Chapman & Chapman filed a division of their application of

March 10, 1909, and copied from the Wintroath patent the three claims in issue, this being the first time that they ever made any claims corresponding to those in issue, although the original application had been on file for more than six years previous thereto. It is also to be noted that Chapman & Chapman never at any time previous to the filing of the divisional application in interference presented claims to the invention disclosed in the counts.

Under these circumstances Chapman & Chapman must be held to be estopped to make the claims in issue, and to have abandoned any right which they may have once had thereto, and in addition it would be against public policy and the spirit of the patent laws to permit Chapman & Chapman at this date to deprive Wintroath of the fruits of his diligence and thereby permit an unlawful extension of the patent monopoly on the invention. In this connection, Wintroath's preliminary statement shows that he had an actual reduction to practice in May 112, and thereafter apparatus embodying
73 the invention in issue was made and sold by him and his assignee to the value of $120,000.

JOHN A. WINTROATH,
LAYNE & BOWLER CORPORATION,
By SYNNESTVEDT & BRADLEY,
Attorneys.

June 17, 1916.

In the United States Patent Office.

Before the Examiner of Interferences.

Interference 39,684.

WINTROATH

vs.

CHAPMAN et al.

June 17, 1916.

Messrs. Adams & Jackson, Monadnock Building, Chicago, Ill.

GENTLEMEN: Please take notice that on Wednesday, June 21, at 10 A. M. or as soon thereafter as counsel can be heard, we will appear before the Examiner of Interferences and argue our Motion for Judgment on the Record, copy of which is attached hereto.

Respectfully,
SYNNESTVEDT & BRADLEY,
Attorneys for Wintroath.

Service of the above acknowledged this 19th day of June, 1916.
ADAMS & JACKSON,
Attorneys for Chapman.

Paper No. 24.

July 8, 1916.

Before the Examiner of Interferences.

In re Interference No. 39,684.

WINTROATH

v.

CHAPMAN and CHAPMAN.

This case is before me for decision on two motions, (1) a motion to shift the burden of proof, filed June 3, 1916, in behalf of Wintroath, and (2) a motion for judgment, filed June 21, 1916, in behalf of the same party. Both motions are strenuously opposed by counsel representing Chapman and Chapman.

74 *Wintroath's Motion to Shift the Burden of Proof.*

As will be shown in determining the motion for judgment the grounds upon which Wintroath's motion to shift the burden of proof is based would, if sufficient to warrant such action, constitute a satisfactory basis for entering judgment against Chapman and Chapman. The motion to shift the burden of proof will therefore be dismissed without further comment.

Wintroath's Motion for Judgment.

Wintroath's motion for judgment is based upon the ground that Chapman and Chapman are precluded from contesting Wintroath's right to the claims corresponding to the issue of this interference under the equitable doctrine of laches as applied by the Court of Appeals of the District of Columbia in the case of Rountree v. Sloan (227 O. G., 744, not yet reported in App. D. C.).

Wintroath is involved in this interference on a patent granted November 25, 1913, as a result of an application filed December 2, 1912. Chapman and Chapman are directly involved on an application filed July 6, 1915, but in placing the burden of proof they have been given the benefit of a prior application, filed March 10, 1909, of which the application directly involved has been treated as a division.

It is urged in behalf of Wintroath that Chapman and Chapman made claims corresponding to the interference issue for the first time when their divisional application was filed on July 6, 1915, whereas it was their duty, if they thought such claims would read upon the disclosure of their pending application, to make them promptly, at least within the time allowed for amendment after office action. Wintroath contends, relying upon the decision in the case of Rountree v.

Sloan, supra, that the failure of Chapman and Chapman, to make the claims until nearly twenty months after the issue of the Wintroath patent, including such claims, is fatal to any right which they might otherwise have had to contest the question of priority of invention as against Wintroath.

In behalf of Chapman and Chapman it is urged that the ground upon which Wintroath's motion is based has been disposed of by the Commissioner on motion to dissolve and that this tribunal has no jurisdiction. No sufficient basis for this contention is found in the record. Wintroath is under order to show cause why judgment should not be entered against him on the record because of his failure to allege a date of conception prior to the filing date of the Chapman and Chapman parent application. If Chapman and Chapman are entitled to the date of that application as a constructive reduction to practice they should prevail and there would be no occasion for the presentation of evidence in behalf of Wintroath. Wintroath, in support of his motion for judgment, alleges that Chapman and Chapman are not entitled to the benefit of their parent application as a constructive reduction to practice, but have lost all right to a
75 patent for the invention in issue because of their laches in presenting claims after the issue of the Wintroath patent. If this contention is well founded it constitutes sufficient basis for a judgment against Chapman and Chapman which would be final, subject to appeal. The merits of the question thus presented were not ruled upon by the Commissioner in his decision of June 6, 1916, refusing to set Wintroath's motion to dissolve for hearing. The Commissioner's action on that motion was expressly based upon the ground that two of the three grounds upon which the motion to dissolve was based were not set forth with sufficient definiteness and that the third ground was one which could not be determined on such a motion. The ground upon which Wintroath's motion, now under consideration, is founded, is held to constitute a basis for a judgment of priority rather than a dissolution of the interference. The objection that this tribunal is without jurisdiction to determine the question thus submitted is therefore overruled.

Chapman and Chapman have charged Wintroath with inexcusable delay in the presentation of this motion. The motion was filed on June 21, 1916. The decision in the case of Rountree v. Sloan, supra, upon which the motion is based, was first published in the Official Gazette of June 13, 1916. Under the circumstances the objection based upon alleged delay is regarded as of no weight and is overruled.

It is also objected, in behalf of Chapman and Chapman, that a judgment, of the nature of that which is sought by Wintroath, may not properly be entered until an opportunity has been offered for the introduction of evidence. It is a sufficient answer to this objection that the decision in the case of Rountree v. Sloan, supra, was based upon the applications involved and the record dates without consideration of other evidence. The allegations of fact set forth in the preliminary statement of Chapman and Chapman may not be regarded as evidence and if Chapman and Chapman are guilty of

laches in making the claims in issue they must be held to be estopped to present evidence on the question of priority of invention.

In behalf of Chapman and Chapman, it is urged that the decision in the case of Rountree v. Sloan, supra, is not controlling upon the point raised by Wintroath's motion for the alleged reason that claims to the subject matter in issue were presented in the parent application of Chapman and Chapman, prior to the issue of Wintroath's patent. Wintroath concedes that the invention in issue was clearly disclosed in the parent application of Chapman and Chapman as filed, but contends that the invention was not claimed until the divisional application was filed.

The claims of the Chapman and Chapman parent application, relied upon in support of the contention that the invention in issue was claimed therein (See Chapman and Chapman's brief, paper No. 21, pages 11 to 13), have been examined and are found to relate to the same general subject matter of invention as do the claims corresponding to the counts of the interference issue. The invention in controversy in this proceeding relates to a deep well pumping structure involving a fluid bearing in combination with one or more
76 ball bearings. Certain claims of the Chapman and Chapman parent application are broader in scope than the claims corresponding to the interference issue and substantially all of the elements of the interfering claims are severally included in the claims originally presented. It is admitted, however, by counsel for Chapman and Chapman that the claims of the parent application did not include the fluid bearing in combination with the ball bearings (Brief, paper No. 21, page 12).

On reference to the files of the Sloan application, involved in the case of Rountree v. Sloan, supra, it is found that the claims originally presented by Sloan (see claims 3 to 6, originally numbered 4 to 7) more nearly approximated the claims of the interference issue in which Sloan was involved than do the claims of the Chapman and Chapman parent application approximate the interfering claims of this proceeding. In the case of Rountree v. Sloan, supra, the question of laches was first raised before the First Assistant Commissioner and was disposed of by him as follows:

The second point from which Rountree takes an appeal is that Sloan is estopped from making the counts of the issue by reason of a delay of over three years after the issuance of the Rountree patent. Whether or not there would be any ground for this contention, if Sloan had no claims reaching to the subject-matter of this issue before the Rountree patent issued, need not be considered because Sloan has always had claims for the invention. Sloan's original claims 4 to 7 (present claims 3 to 6) cover substantially the same invention as is covered by the present counts. It was therefore an inadvertence to have issued the Rountree patent while these claims of Sloan were reaching to the same invention, and Sloan should not be held estopped from making these counts (See Lotz v. Kenny, 135 O. G., 1801, 31 App. D. C., 205 and Shreeve v. Grissinger, 202 O. G., 951).

Decision of First Assistant Commissioner Newton (Rountree v. Sloan, July 2, 1915).

With respect to this point the Court of Appeals (Rowntree v. Sloan, supra) said:

We have not overlooked his (Sloan's) contention that there were claims in his application as originally filed approximating the claims of the issue. It is enough to say that we are clearly of the opinion that this contention is not justified by the record."

In view of the last mentioned ruling it is held that this case cannot be distinguished from the case of Rowntree v. Sloan, supra, on the alleged ground that the invention in issue was claimed in the parent application of Chapman and Chapman.

In the case of *Ex parte* Fritts, (237 O. G., 737, not yet reported in App. D. C.) the Court of Appeals of the District of Columbia ruled that an applicant is in duty bound, after the issue of a patent to another for an invention to which he claims title, to assert his claims thereto within a reasonable time, to the end that an interference might be declared and the issue of priority determined; and that by failing to assert such claims he must be held to have abandoned them. In that case patents had been issued to parties other than the applicant and had run their whole term of seventeen years. In the case
of Rowntree v. Sloan, supra, the Rowntree patent issued about
77 three years prior to the time when Sloan first made the conflicting claims in his application. The examiner of interferences, as to certain counts of the issue, had awarded priority of invention to Rowntree, on the ground that Sloan had no right to make claims corresponding to such counts in view of his application disclosure. That ruling was affirmed by the Board of Examiners-in-Chief, but was reversed by the First Assistant Commissioner. The Court of Appeals of the District of Columbia, after making a general statement to the effect that, in their opinion, the view of the lower tribunals of the Patent Office was correct, based their decision upon the ground that Sloan's laches in failing, within a reasonable time after the issue of the Rowntree patent, to make the interfering claims, estopped him to make them at all. After referring to the case *In re* Fritts, supra, the court said:

"By his delay, if his present contention should be accepted, the life of the monopoly would be extended for a period of three years. If he thought these claims read upon his application, it was his duty promptly to make them, at least within the time allowed for amendment after Office action, and his failure to do so is fatal to his present contention. We have not overlooked his contention that there were claims in his application as originally filed approximating the claims of the issue. It is enough to say that we are clearly of the opinion that this contention is not justified by the record."

The decision in the case of Rowntree v. Sloan, supra, is regarded as controlling to the effect that, under similar circumstances, a period of three years could not be regarded as a reasonable time. Although the expression of opinion by the court to the effect that in such cases the claims must be filed within the time provided for amendment (one year) was not necessary to the decision rendered and is to that extent, *obiter dictum*. It constitutes a clear statement by a controlling tribunal of a limit to the period which should be regarded,

in a similar case, as a reasonable time. Such a positive expression of opinion by a superior tribunal is highly persuasive in its effect and cannot be disregarded. The present case appears to be on all fours with the case of Rowntree v. Sloan, supra, and cannot be distinguished therefrom merely because the period of laches was one of twenty months rather than three years.

That the claims were finally presented in this instance in a divisional case rather than in the original is believed to be immaterial. The effect is the same. The public has already been subject to a monopoly under the Wintroath patent, for a period of more than two years. Should the interference be declared and finally determined in favor of Chapman and Chapman, the public would be subjected to a monopoly for the full period of seventeen years in addition to the time which has elapsed since the issue of the Wintroath patent and the time which would be consumed in the prosecution of an interference.

Public notice is given of the grant of a patent at the time of its issue. The general public should not be subjected to the burden of a materially extended monopoly because of the failure of an interested party to take advantage of such notice within a reasonable
78 time.

Wintroath's motion to shift the burden of proof is dismissed.

Wintroath's motion for judgment is granted.

Priority of invention of the subject-matter in issue is awarded to John A. Wintroath, the junior party.

Limit of appeal: July 28, 1916.

H. E. STAUFFER,
Examiner of Interferences.

Docket Clerk.
Jul. 24, 1916.
U. S. Patent Office.

$10, C'k, Rec'd Jul- 24, 1916. A. C. C., U. S. Pat. Office.

Intf. No. 39,684, Paper No. 25.

In the United States Patent Office.

Interference No. 39,684.

JOHN A. WINTROATH

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

Subject-matter: Deep Well Pumps.

Appeal.

Hon. Commissioner of Patents.

SIR: We hereby appeal to the Examiners-in-Chief from the decision of the Examiner of Interferences granting Wintroath's motion

for judgment on the record against us and awarding priority of invention of the subject-matter of the issue to Wintroath, the junior party. The following are assigned as reasons of appeal:

(1) The Examiner of Interferences erred in taking jurisdiction of and hearing Wintroath's said motion for judgment.

(2) The Examiner of Interferences erred in granting Wintroath's said motion for judgment.

(3) The Examiner of Interferences erred in awarding priority of invention of the subject-matter of the issue to Wintroath, the junior party.

(4) The Examiner of Interferences erred in not awarding priority of invention of the subject-matter of the issue to Chapman and Chapman, the senior party.

(5) The Examiner of Interferences erred in considering the questions of laches and estoppel on a motion for judgment on the record.

(6) The Examiner of Interferences erred in not holding that the questions of estoppel and laches presented in Wintroath's motion for judgment have no bearing on the question of priority and that he had no jurisdiction to consider them.

79 (7) The Examiner of Interferences erred in not holding that the doctrine of Norling v. Hayes, (1911 C. D., 347, 166 O. G., 1282), is controlling in this case.

(8) The Examiner of Interferences erred in holding that the doctrine announced in Rowntree v. Sloan (227 O. G. 744), although *obiter dictum*, is controlling in this case and required the rendering of judgment of priority in favor of Wintroath.

(9) The Examiner of Interferences erred in holding that the subject-matter of the issue was not claimed in the Chapman and Chapman parent application.

(10) The Examiner of Interferences erred in holding that Chapman and Chapman are estopped from making the claims of the issue.

(11) The Examiner of Interferences erred in rendering judgment of priority against the senior party, Chapman and Chapman, without permitting them to take testimony in support of their right to a patent for the subject-matter of the issue.

(12) The Examiner of Interferences erred in holding that Chapman and Chapman are not entitled to the benefit of their parent application as a constructive reduction to practice.

(13) The Examiner of Interferences erred in awarding judgment of priority to Wintroath without permitting Chapman and Chapman to prove the facts set up in their preliminary statement.

(14) The Examiner of Interferences erred in overruling the objection that the subject-matter of Wintroath's motion for judgment had been previously disposed of by the Law Examiner.

(15) The Examiner of Interferences erred in overruling the objection that Wintroath's motion for judgment was made too late, and in holding that the date of the decision of the Court of Appeals of the District of Columbia in *Rowntree* vs. *Sloan*, *supra*, excused Wintroath's delay.

(16) The Examiner of Interferences erred in holding that the ground of Wintroath's motion for judgment constitutes a basis for judgment of priority.

(17) The Examiner of Interferences erred in assuming the authority and functions of a chancellor in a purely statutory proceeding to determine the single issue of priority.

MATTHEW T. CHAPMAN,
MARK C. CHAPMAN,
By ADAMS & JACKSON,
Their Attorneys.

Chicago, July 22, 1916.

80 Mail Room.
Jul- 24, 1916.
U. S. Patent Office.
$10 Applied.

Docket Clerk.
Jul- 24, 1916.
U. S. Patent Office.

July 22, 1916.

Hon. Commissioner of Patents, Washington, D. C.

SIR: We enclose herewith appeal to the Examiners-in-Chief and assignment of errors in interference No. 39,684, *Wintroath v. Chapman & Chapman*. We also enclose check for $10.00 covering the appeal fee.

In view of the fact that this is the vacation season, we respectfully request that the hearing be put off until some time in the fall.

Respectfully,

ADAMS & JACKSON.

Encs.

Appeal No. 8, Paper No. 32.

Decision.

Hearing Oct. 20, 1916. J. R. S.

Appeal No. 85.

UNITED STATES PATENT OFFICE, Nov. 18, 1916.

Before the Examiners-in-Chief, on Appeal.

In the Matter of the Interference Between the Patent to John A. Wintroath, No. 1,079,679, Granted November 25, 1913, on an Application Filed December 2, 1912, Serial No. 734,649, and the Application of Matthew T. and Mark C. Chapman, Filed July 6, 1915, Serial No. 38,254, which is a Division of Application Filed March 10, 1909, Serial No. 482,517. Interference No. 39,684.

Improvement in Deep Well Pumps.

Messrs. Synnestvedt & Bradley and Mr. Robert A. Steps, attorneys for Wintroath.

Messrs. Adams & Jackson, attorneys for Chapman & Chapman.

The decision below was in favor of the party Wintroath and the senior party, Chapman & Chapman, has appealed from that decision.

The grounds of the appeal are variously stated but the real and substantial question to be determined is whether the failure of Chapman & Chapman to make claims corresponding to the counts of the issue until nearly twenty months after the issue of the Wintroath patent is determinative of the question of priority.

Wintroath's patent was granted on November 25, 1913, 81 upon an application filed December 2, 1912. Chapman & Chapman's application was filed July 6, 1915, as a division of a prior application dated March 10, 1909. Were it not for the delay in making the claims involved in the interference, Chapman & Chapman would be entitled to a priority decision on the record, no testimony having been taken by either party.

The decision of the examiner of interferences was based upon the decision of the Court of Appeals of the District of Columbia in the case of Rowntree vs. Sloan, 227 O. G., 744 (not yet reported in App. D. C.). The brief filed on behalf of Chapman & Chapman is mainly based upon the contention that the Court's decision is not controlling because questions of estoppel, abandonment, and laches were withdrawn from consideration by the Court and were not urged upon the Court as a basis for a reversal of the decision by the Patent Office in favor of Sloan. The contention is that the only question actually before the Court was whether Sloan was entitled to make claims corresponding to the counts of the issue and that, obviously, a decision on any additional grounds, and particularly on grounds not presented to the Court, was pure *obiter dictum* and of no authority.

The brief is full of citations of cases which, it is contended, are in contravention of the ruling of the Court of Appeals in the case of Rowntree vs. Sloan. We have carefully considered all of these cases and find that they are without weight in so far as this tribunal is concerned. The office is consistently following the practice set forth in the Rowntree vs. Sloan case and we do not feel that we are authorized to set aside that practice. This, in our opinion, should only be done by the Court of Appeals.

Reference is made in the brief to a decision of the Commissioner of Patents which, it is contended, has a direct bearing upon the question of priority. We are unable to discover, however, that it has any relevency to that question.

In view of the above we find that John A. Wintroath was the first and original inventor and therefore sustain the decision of the Examiner of Interferences awarding priority of invention to him.

Limit of appeal: December 8, 1916.

T. G. STEWARD,
FRANK C. SKINNER,
S. E. FOUTS,
Examiners-in-Chief.

82 Docket Clerk,
Dec. 6, 1916,
U. S. Patent Office.

$20, C'k, Rec'd Dec. 6, 1916. G. C. C., U. S. Pat. Office.

Intf. No. 39,684, Paper No. 34.

In the United States Patent Office.

Interference No. 39,684.

JOHN A. WINTROATH

v.

CHAPMAN and CHAPMAN.

To the Commissioner of Patents.

SIR: We hereby appeal to you in person from the decision of the Examiners-in-Chief, made November 18, 1916, in the interference between our application for letters patent for improvement in Deep Well Pumps and the letters patent of John A. Wintroath, in which priority of invention was awarded to said John A. Wintroath. The following are assigned as reasons of appeal:

1. The Board was without jurisdiction to hear and determine any question but that of priority of invention, and erred in considering and applying the doctrine of equitable estoppel announced in *Rowntree v. Sloan*, 227 O. G. 744.

2. The Board erred in holding that it was not authorized to set aside the practice adopted in *Rowntree* v. *Sloan*.

3. The decisions in *Norling* v. *Hayes*, 165 O. G. 1282; 37 App. D. C. 169, and *Slingluff* v. *Sweet & Spinasse*, 230 O. G. 659, are binding on the Patent Office tribunals, and the Board erred in disregarding said decisions and awarding priority to Wintroath, the junior party, on grounds which it had no jurisdiction to consider *inter partes*.

4. The Board erred in not awarding priority of invention of the issue to Chapman & Chapman, the senior party.

5. The Board erred in not awarding priority of invention of the issue to Wintroath, the junior party.

6. The Board erred in not reversing the decision of the Examiner of Interferences awarding priority of invention to Wintroath.

Signed at Chicago, in the County of Cook, and State of Illinois, this 4th day of December, 1916.

ADAMS & JACKSON,
Attorneys for Chapman and Chapman.

83 Intf. No. 39,684, Paper No. 39.

Recorded, Vol. 122, P. 183.

Hearing Jan. 10, 1917. S. E. T.

In the United States Patent Office.

Patent Interference No. 39,684.

WINTROATH

v.

CHAPMAN and CHAPMAN.

Appeal from the Examiners-in-Chief.

Deep Well Pumps.

Patent granted John A. Wintroath November 25, 1913, No. 1,079,679, on application filed December 2, 1912.

Application of Matthew T. Chapman and Mark C. Chapman filed July 6, 1915, division of application filed March 10, 1909.

Messrs. Synnestvedt & Bradley and Mr. Robert A. Steps for Wintroath.

Messrs. Adams & Jackson for Chapman and Chapman.

This is an appeal by Chapman and Chapman from a decision of the examiners-in-chief affirming the decision of the examiner of interferences and awarding priority of invention to Wintroath.

This is the first case which has been brought before me since the decision in Rowntree v. Sloan (227 O. G., 744, not yet reported in App. D. C.), wherein the question of loss of right by laches in making claims for a period of less than two years after the grant of a patent is presented without any complication.

It is admitted in the brief on appeal of Chapman and Chapman that no claim to the fluid and ball bearings in combination was inserted in the application until about twenty months after the granting of the patent to Wintroath. Thus, on page 33, it is stated that the original claims were much broader in scope than the claims of the issue; on page 34, that the bearings were each particularly claimed, but not in combination; on page 36, that the original application contained claims dominating the subject matter of the issue, but did not contain claims for the precise combination of the issue.

On the other hand, in the brief for Wintroath there is no contention against Chapman and Chapman excepting delay in making the claims to the invention. On pages 7 and 8, the point is urged that Wintroath had entered the field as an independent inventor and had

spent thousands of dollars in placing the devices on the market, and that Chapman and Chapman had made no claims for more
84 than three years after Wintroath began, or until twenty months after the patent had been regularly issued to him.

Sloan waited three years after the grant of a patent to Rowntree before copying the claims involved in that interference. The court held that Sloan had been guilty of fatal laches and that it was his duty to have made the claims promptly, at the farthest, "within the time allowed for amendment after office action," namely, one year.

To establish a fixed limit of one year after which claims may not be copied from a patent presents two serious difficulties.

In the first place, an applicant who has waited more than one year to amend his application may save his rights by showing to the Commissioner that the delay was unavoidable (Revised Statutes, Section 4894). Moreover, generally speaking, laches is a charge which is rebuttal unless the delay exceeds a period specified by statute. No matter what period be taken it seems clear, therefore, that the right to explain the delay must be granted to the applicant.

In the second place, an inventor after another has patented the invention may wait up to two years before filing his own application therefor (Revised Statutes, Section 4886). Since the making of a claim is a mere incident to the patenting of an invention, a patent could not be denied on any theory of laches in such a case.

No reason is seen why a stricter rule should be laid down to regulate the conduct of an inventor who has already filed his application at the time when a rival patent is granted than would be applied to one who filed after the rival patent was granted.

In the Rowntree-Sloan case the question whether the limit of time should be set at one year or two years was not directly involved and therefore presumably was not considered as fully as it would have been had it been necessary for the disposition of the case.

I am persuaded that on further consideration the Court of Appeals instead of selecting the time allowed for amendment by Section 4894 will follow Section 4886, making the time two years.

The limit of two years would also be supported by analogy with the treatment of reissue cases in Miller v. Brass Company, 104 U. S., 350, Mahn v. Harwood, 112 U. S., 354, and Wollensak v. Reiher, 115 U. S., 101. There is, however, this difference that whereas the rule in reissue cases demands diligence at all times with especially good explanation if the delay exceeds two years, the diligence of one who, having already filed, copies its claims within two years of the granting of a patent, cannot be inquired into without imposing a condition more strict than is imposed by Section 4886 upon one who does not file his application until after the rival patent has been granted.

The rule therefore would set a period of two years as a limit below which delay would not be inquired into, and beyond which it must be satisfactorily accounted for.

Under this rule, the primary examiner should deny the right of an applicant to make a claim taken from a patent where the period of de-

lay exceeds two years, and declare an interference only where a *prima facie* case overcoming the charge of dilatoriness is made out
85 by the applicant. Such a showing would of course be open to attack *inter partes*.

For the reason indicated above, award of priority must be made to Chapman and Chapman.

The decision of the examiners-in-chief is reversed.

THOMAS EWING,
Commissioner.

June 18, 1917.

Docket Clerk,
Jul- 6, 1917.
U. S. Patent Office.

Mail Room,
Jul- 6, 1917,
U. S. Patent Office.

Intf. No. 39,684, Paper No. 41.

In the United States Patent Office.

Before the Commissioner of Patents.

Interference No. 39,684.

JOHN A. WINTROATH

v.

CHAPMAN and CHAPMAN.

Subject-matter: Deep Well Pumps.

And now comes John A. Wintroath, by Synnestvedt & Bradley, his attorneys, and gives notice to the Commissioner of Patents of his appeal to the Court of Appeals of the District of Columbia from the decision of the said commissioner, rendered on June 18, 1917, awarding priority of invention to Chapman and Chapman in the above-entitled case, and assigns as his reasons of appeal the following:

1. The Commissioner erred in awarding priority to Chapman and Chapman.

2. The Commisioner erred in holding that the question of diligence by Chapman and Chapman in making the claims in issue should be decided by analogy to Rev. Stat. sec. 4886 rather than to sec. 4894.

JOHN A. WINTROATH.
By SYNNESTVEDT & BRADLEY,
His Attorneys.

Philadelphia, Pa., July 5th, 1917.

Endorsed on cover: Commissioner of Patents. Patent appeal docket, No. 1132. John A. Wintroath, appellant, vs. Matthew T. Chapman and Mark C. Chapman. Court of Appeals, District of Columbia. Filed Jul- 30, 1917. Henry W. Hodges, clerk.

86-88 *Return to Writ of Certiorari.*

Court of Appeals of the District of Columbia. October Term, 1917.

Patent Appeal Docket, No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

(Interference No. 39,684.)

Filed November 2, 1917. Printed November 13, 1917.

89 Court of Appeals of the District of Columbia.

Patent Appeal Docket, No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN AND MARK C. CHAPMAN.

Docket Clerk,
Oct. 27, 1917,
U. S. Patent Office.

THE UNITED STATES OF AMERICA, *ss:*

[Seal Court of Appeals, District of Columbia, 1893.]

The President of the United States of America to the Honorable the Commissioner of Patents, Greeting:

Whereas in a certain cause before the Commissioner of Patents between John A. Wintroath and Matthew T. Chapman and Mark C. Chapman, (Interference No. 39684) Subject-Matter: deep-well pumps, which cause was removed to the Court of Appeals of the District of Columbia by virtue of an appeal, agreeably to the act of Congress in such case made and provided, a diminution of the record and proceedings of said cause has been suggested, to wit:

File wrapper and contents of Patent #1,149,633, issued August 10, 1915, to Chapman and Chapman.

You, therefore, are hereby commanded that, searching the record and proceedings in said cause, you certify what omissions, to the extent above enumerated, you shall find to the said Court of Appeals,

so that you have the same, together with this writ, before the said Court of Appeals forthwith.

Witness the Honorable Constantine J. Smyth, Chief Justice of the said Court of Appeals, the 27th day of October, in the year of our Lord one thousand nine hundred and seventeen.

HENRY W. HODGES,
Clerk of the Court of Appeals of the District of Columbia.

[Endorsed:] Court of Appeals of the District of Columbia. No. 1132, P. A., Oct. Term, 1917. John A. Wintroath, Appellant, vs. Matthew T. Chapman and Mark C. Chapman. Writ of Certiorari.

90 2—390.

United States of America,

Department of the Interior,

United States Patent Office.

To all to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the Records of this Office of a Certain Paper, being Additional Paper,

File wrapper and contents of Patent #1,149,633, issued August 10, 1915, to Chapman and Chapman, Assignors to The American Well Works,

for the diminution of the Record in the matter of Interference Number 39,684, Wintroath vs. Chapman & Chapman, Subject-Matter: Deep Well Pumps.

Furnished in obedience to the Writ of Certiorari of the United States Court of Appeals of the District of Columbia, which Writ is hereto attached and returned herewith.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 2nd day of November, in the year of our Lord one thousand nine hundred and seventeen and of the Independence of the United States of America the one hundred and forty-second.

[Seal Patent Office, United States of America.]

F. W. H. CLAY,
Acting Commissioner of Patents.

91 2—437.

Div. 9.

Number (Series of 1900) 482,517.

1909.

(Ex'r's Book) 23—234.

Patent No. 1,149,633.

Name-: Matthew T. Chapman and Mark C. Chapman, Assors. to The American Well Works, of Aurora, Ill., a Corp. of Illinois,
Of Aurora,
County of ——,
State of Illinois.
Invention: Deep Well Pumps.

Parts of application filed.	Original.	Renewed.
Petition	Mar. 10, 1909	—— —, 190–
Affidavit	" " 190"	—— —, 190–
Specification	" " 190"	—— —, 190–
Drawing 8 Sheets	" " 1909	—— —, 190–
Model or specimen	—— —, 190–	—— —, 190–
First Fee Cash $15.	Mar. 10, 1909	—— —, 190–
" " Cert.	—— —, 190–	—— —, 190–
Appl. filed complete	Mch. 10, 1909	—— —, 190–
Examiner F. M. Tryon, Ex.,	June 26, 1915.	—— —, [190–]*
Countersigned —— ——, For Commissioner.	—— ——, For Commissioner.	—— —, [190–]*
Notice of Allowance 4.	June 30, 1915	—— —, 190–
Final Fee Cash $20	July 12, 1915	—— —, 190–
" " Cert.	—— —, 190–	—— —, 190–
Patented August 10, 1915.		

Associate Attorney —— ——. Attorney [Bond],* Adams, [Pickard]* & Jackson,
2. 1147 Monadnock Bldg.,
Chicago, Ill.

Name: —— ——. Serial No. —.
Patent No. —. Date of Patent —— —, ——.

3. 103/43.
482,517.

[On left margin:] Division of App., No. —, filed —— —, 19—.

[*Words and figures enclosed in brackets erased in copy.]

92 2–327.

$15, c'k, Received Mar. 10, 1909. Y. Chief Clerk, U. S. Patent Office.

Division 9, Paper No. 1,
Mar. 12, 1909,
U. S. Patent Office.

Memorandum of Fee Paid at United States Patent Office.

(Be careful to give correct Serial No.)

—— —, 191–.

Serial No. —.
Inventors:
Matthew T. Chapman.
Mark C. Chapman.
Patent to be issued to —— ——.
Name of invention: Deep Well Pump.
Date of payment: Mch. 8, 1909.
Fee: First.
Date of filing: —.
Date of circular of allowance: —.

BOND, ADAMS, PICKARD & JACKSON,
Solicitors.

Send patent to Bond, Adams, Pickard & Jackson, 1147 Monadnock Building, Chicago.

Mail Room,
Mar. 10, 1909,
U. S. Patent Office.

482,517.

Division 9, Paper No. 1,
Mar. 12, 1909,
U. S. Patent Office.

Petition.

To the Commissioner of Patents:

Your petitioners, Matthew T. Chapman and Mark C. Chapman, residing at Aurora, in the County of Kane and State of Illinois and citizens of the United States, pray that Letters Patent may be granted them for the improvements in Deep Well Pumps set forth in the annexed specification; and they hereby appoint the firm of

Bond, Adams, Pickard and Jackson, (composed of A. H.
93 Adams, C. E. Pickard, and J. L. Jackson,) of the City of Chicago, Illinois, their Attorneys, with power of association, substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the Patent, and to transact all business in the Patent Office connected therewith. Petitioners' Post Office addresses are c/o American Well Works, Aurora, Illinois.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Oath.

STATE OF ILLINOIS,
County of Kane, ss:

Matthew T. Chapman and Mark C. Chapman, the said Petitioners, being duly sworn, depose and say that they are citizen- of the United States and residents of Aurora in the County of Kane, State of Illinois; that they verily believe themselves to be the original, first and joint inventors of the improvements in Deep Well Pumps described and claimed in the annexed specification; that they do not know and do not believe that the same were ever known or used before their invention or discovery thereof; or patented, or described in any printed publication in any country before their invention or discovery thereof, or more than two years prior to this application; or in public use or on sale in the United States for more than two years prior to this application; and that no application for patent for said improvements has been filed by them or their representatives or assigns in any foreign country.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Subscribed and sworn to before me this 6 day of March 1909.
[SEAL.] W. E. KNICKERBOCKER,
Notary Public.

Specification.

To all whom it may concern:

Be it known that we, Matthew T. Chapman and Mark C. Chapman, citizens of the United States, residing at Aurora, in the County of Kane and State of Illinois, have invented certain new and useful improvements in Deep Well Pumps, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to pumps for raising water from deep wells, and has to do more particularly with pumps of the centrifugal type. The object of our invention is to provide a new and improved pump by which a larger amount of water may be pumped in a given time or by a given expenditure of power. To this end, it consists in the

improvements hereinafter described and pointed out in the claims.

In the accompanying drawings,—

Figure 1 is a sectional view, illustrating our improved pump;

Figure 2 is a cross-section on line 2—2 of figure 1, illustrating the means for centering and supporting the shaft bearings;

Figure 3 is a section on line 3—3 of figure 1, illustrating the construction of the lower end portion of the pumping mechanism;

Figure 4 is a view, showing a motor for driving the operating pump;

Figure 5 is an enlarged detail, being a vertical section on line 5—5 of figure 6, illustrating the stationary portion of the water-elevating mechanism;

Figure 6 is a cross-section on line 6—6 of figure 5;

Figure 7 is a plan view of the rotary portion of the water-elevating mechanism;

Figure 8 is a horizontal section on line 8—8 of figure 11;

Figure 9 is a detail, being a partial section on line 9—9 of figure 7;

Figure 10 is an inverted plan view of the part shown in figure 7;

Figure 11 is a vertical section on line 11—11 of figure 7;

Figure 12 is a partial sectional view showing the upper portion of the pump;

Figure 13 is a vertical section showing a modified construction of the coupling devices;

Figure 14 is a horizontal section on line 14—14 of figure 13;

Figure 15 is an enlarged side view of the spider shown in figures 13 and 14;

Figure 16 is a vertical section showing a modification;

Figure 17 is an enlarged vertical section showing still another construction of the coupling devices;

Figure 18 is a cross-section on line 18—18 of figure 17;

Figure 19 is a side view of the form of spider shown in figures 17 and 18;

Figure 20 is an enlarged sectional view of a modified form of impeller
Per E. pump-cylinder and ∧ [water-wheel]*;

Figure 21 is a cross-section on line 21—21 of figure 20;

Figure 22 is a cross-section on line 22—22 of figure 20, looking up; and

Figure 23 is a cross-section on line 23—23 of figure 20, looking down.

Our improved pumping mechanism is in the nature of a centrifugal turbine pump, since one or runners or impellers
" " more ∧ [water-wheels]* in the nature of turbine wheels

[*Words and figures enclosed in brackets erased in copy.]

are employed in connection with fixed inclined blades
runner
" " to force the water up, the [turbine]* blades acting by their rotation to throw the water outward against the stationary inclined blades and thereby compel it to rise
95 through the pump cylinder. Suitable provision is made to
runners
Per E. counteract the downward pressure on the ∧ [turbine wheels]* so that such pressure is neutralized soon after the pump is put in service.
runners
" " The several ∧ [turbine wheels]* are mounted on a common shaft vertically disposed in a suitable cylinder,
mounted
" " its lower end being ∧ [stepped]* in a bearing which centers and guides it. Intermediate guides and bearings are also provided and at the lower end of the shaft there is a water piston which is fitted in a suitable cylinder, to which water is admitted under pressure
runners
" " equal to that of the column of water upon the ∧ [turbine wheels],* the water below said water piston acting in an upward direction so as to substantially neutralize the downward pressure of the water in the pump cylinder, thus causing the shaft to rotate freely. The shaft is rotated by power applied to it near its upper end, either by a belt or by a direct-connected mo-
Insert E'. tor ∧. The upper portion of the pump shaft is en-
E.'
closed by a sleeve or tube so that the water in the well does not reach it, the water being discharged through a suitable outlet which connects with the upper end of the pump cylinder.

Referring to the drawings for a description of the particular embodiments of our invention therein illustrated,—

12 indicates a tube, which, for convenience, will be termed the well-tube as it extends down into the well and forms a conduit for conducting the water raised up to the surface where it is discharged through an elbow or other outlet 13 which, as shown in figures 1 and 12, connects with the upper end of the well-tube 12. It will be understood that the well-tube is made up of any desired number of sections which may be united by plain couplings 14 shown in figure 1, but are best united by our improved couplings hereinafter described.

Referring now more particularly to the construction shown in figures 1 to 11, 15 indicates a base-plate which supports the portions of the mechanism which are above ground, as shown in figure 1. 16 indicates several tubular sections, which will be termed "pump cylinders", since the pumping mechanism operates in them. Any suitable number of pump cylinders may be employed, depending on the depth of the well, the volume of water to be pumped, or the quantity of water to be pumped in a given time. Said sections are

[*Words and figures enclosed in brackets erased in copy.]

alike and are fitted together so that the several units when united serve to make up a sectional pump cylinder. The several sections may be secured together in any suitable way, as by bolts. They are adapted to be lowered into the well, the uppermost cylinder 16 being secured to the end of the well-tube preferably by means of a screw collar 17 which screws upon the lower end of the well-
96 tube 12. 18 indicates a bottom section or cylinder, which is secured to the lowermost cylinder 16 and is provided with a bearing for the lower end of the shaft, as will be hereinafter described.

19 indicates the pump shaft, which is a vertically-disposed shaft mounted centrally in the well-tube and extending from above the ground down to the bottom section 18. Said shaft is preferably solid, but may be tubular, if desired, and is composed of sections united by couplings 20, as shown in figure 1. At its upper end it is provided with a nut 21 preferably secured thereto by a set-screw 22, as shown in figure 1, said nut bearing on a top bearing-plate 23 which rests on bearing-balls 24 which in turn rest on a plate 25 carried by an adjusting-plate 26. Said adjusting-plate 26 screws upon a head 27, which in turn is carried by a framework 28 resting on the base-plate 15. Thus it will be seen that the shaft 19 is suspended upon the balls 24 by means of the nut 21. The latter is preferably provided with a cap 29 which encloses and protects the ball bearings resting on the upper edge of the adjusting-plate 26. By screwing the adjusting-plate 26 up or down, obviously the shaft

to compensate for wear, as hereinafter described.

Per E. 19 may be raised or lowered $\wedge$. In order to lock the adjusting-plate 26 in its different positions, a set-screw 30 is provided, as shown in figure 1, but any other suitable means for the purpose may be employed.

" " The lower end of the shaft 19 is $\wedge$ [stepped]* in a
mounted
supported

" " bearing sleeve 31 carried by radial arms 32 $\wedge$ [carried]* by the bottom section 18, as best shown in figures 1 and 3, said arms being in the lower portion of a cylinder 33, which is provided in said section 18, as shown. The lower portion of said cylinder is tapered downwardly and inwardly toward the center where an opening 34 is provided to permit sand and other similar particles to escape. The upper portion of said cylinder receives a piston 35 which fits it closely and moves vertically therein, said piston being secured upon the lower end of the shaft 19. The function of the piston 35 will be hereinafter set forth. 36 indicates an intermediate bearing for the shaft 19, one or more of which may be provided, said bearing consisting of a babbit-ed sleeve which is supported by radial bolts 37, the outer ends of which are connected with the well-tube, as shown in figures 1 and 2. Said bearing, therefore, centers the shaft 19 in addition to supporting it against lateral strain. 38-39 indicates tubes, which connect with the upper and lower ends,

[*Words and figures enclosed in brackets erased in copy.]

respectively, of the bearing sleeve 36, the tube 38 extending up through the elbow 13 and being provided with a suitable cap 40. The latter tube serves to keep the dirty water—from grinding or cutting the joints or bearings of the shaft 19. A stuffing-box 41 prevents the escape of water where said tube passes through said elbow. The lower end of the tube 39 extends down to the upper end of the cylinder 16, where it is connected with part of the water-
97 elevating mechanism, as hereinafter described. In the drawings we have shown two sleeves 38-39, but a greater number may be employed, if desired, depending on the depth of the well,—it being understood that the shaft 19 is enclosed by said tubes which separate the upper portion thereof from the water in the well-tube 12.

The shaft 19 may be rotated by any suitable mechanism, as, for example, by means of power applied through pulleys 42, as shown in figure 1, or by a motor 43 mounted directly upon the upper end thereof, as shown in figure 4.

The interior construction of the cylinders 16 is best shown in figures 5 and 6, from which it will be seen that each cylinder is really in two parts, the upper part 16^a having a central sleeve 44 suitably babbit-ed and forming a bearing for the pump shaft 19. Said sleeve is provided at its lower end with an outwardly-extending radial flange 45 which terminates a short distance from the inner face of the cylinder section, leaving a narrow annular space 46, shown in figures 5 and 6. Around the outer margin of the flange 45 there is provided a tapered sleeve 47, the smaller diameter of which is at the top, said sleeve being substantially parallel with the inner face of the cylinder section so that an upwardly and inwardly inclined annular channel 48 is provided for the passage of water. In the annular passage 46 between the margin of the flange 45 and the inner surface of the cylinder section are a series of inclined blades 49 which are fixed to the inner face of the cylinder section and are arranged at short intervals, forming inclined passages through which the water rises to the passage 48 when forced violently outward against said blades 49, as hereinafter described.

16^b indicates the lower member of the cylinder 16, which is fitted thereto, as shown in figure 5, and is shaped to provide a vertical passage which is in the shape of an hour-glass, the intermediate portion thereof being contracted, as shown at 50 in figure 5, the upper half of said section forming an inclined bottom 51 for the chamber which contains the blades 49. This tapered bottom cooperates with the turbine wheels, as will hereinafter appear. All the parts of the cylinder 16 are fixed or rigid.

pump runners or impellers

Per E. 52 indicates the ^ [turbine wheels],* which act to throw the water outward against the inclined blades 49 which direct it upward through the pump cylinders and

runners

" " well-tube. Said ^ [wheels],* of which any number may be used, are placed in the cylinders 16, as shown in figure 1, being mounted upon and secured to the

[* Words and figures enclosed in brackets erased in copy.]

pump shaft 19 so as to rotate therewith. This is best secured by making the pump shaft in sections, the ends
98 of adjoining sections being screwed into the hub 53
runner
Per E. of the ∧ [wheel]* 52, as shown in figure 1, so that the hub serves as a coupling to unite the sections of the
runner
" " shaft and at the same time the [turbine]* is prevented from moving longitudinally upon the shaft.
runners
" " Each of the ∧ [turbine wheels],* in the construction shown in figures 1 and 7 to 11, comprises the hub 53 and a series of downwardly-extending spiral blades 54 similar in some respects to the blades of a propeller, said blades being connected intermediately by an annular flange 55 which extends around the wheel a short distance from the upper ends of the blades 54, as shown in figure 11, being intersected by said blades, as illustrated in figure 9. As best shown in figures 1 and 11, the lower edges of the blades 54 are inclined to conform to the inclination of the upper inner face of the member 16^b which serves to confine the water and facilitate the action of the blades 54 upon it; also to direct the water upward against the stationary blades 49 as it is forced outward and upward by the rotation
runner
Per E. of the ∧ [wheel].* The tapered lower face of the member 16^b, as best shown at 56 in figures 1 and 5, directs
runner
" " the upwardly-flowing water toward the ∧ [water wheel]* above it.

The water-elevating mechanism is lowered into the well
runner
" " until the lowermost ∧ [turbine wheel]* at least is sub-
runners
" " merged when, by rotating the shaft 19, the ∧ [turbine wheels]* act to force the water in which they are immersed outward and upward against the stationary blades 49, which, in turn, direct it upward to the space above
runner
" " the ∧ [wheel]* where it is subjected to the action of
runner
" " the next higher ∧ [turbine wheel],* if more than one is
runner
" " used. After passing the uppermost ∧ [turbine wheel]* the water continues to rise until it is discharged through
shaft
Per F. the outlet 13. For the purpose of lubricating the ∧ bear-
" "
[runner]*
" E. ings [of the upper ∧ turbine wheel]* the lower end por-

[*Words and figures enclosed in brackets erased in copy.]

tion of the tube 39 is perforated, as shown at 57 in
99 figure 1, the perforations being protected by a screen 58, or other suitable filtering medium, to prevent sand or other par-
Insert F¹. ticles from entering the tube. ^
F¹.

In order to counteract the downward pressure upon the pump, we provide for admitting water to the cylinder 33 below the piston 35 by providing a conduit 59 in each of the pump cylinders, best shown in figures 1 and 5, said conduit being formed by registering passages in each of the several cylinder sections. The lowermost section 18 is also provided with a passage 60 which communicates with said conduit and with the cylinder 33 so that water is admitted through said conduit to said cylinder. The upper end of the conduit 59 opens into the upper portion of the uppermost cylinder 16 above the
runner
Per E. ^ [water wheel]* therein, as shown at 61 in figures 1 and 5, so that the pressure of the water in the well-tube 12 is communicated from below to the piston 39, thus creating a balance and relieving the shaft 19 with the pumping mechanism supported thereby from downward pressure. By making the bottom of the cylinder 33 conical and providing the outlet 34 particles of sand or other matter carried by the water throught the conduit 59 gravitate to the bottom of the cylinder and may escape through such opening, thereby avoiding danger of grinding which might occur in case of sand getting in between the cylinder 33 and piston
Insert E² 35.^
E².

From the foregoing description it will be seen that our improved pumping mechanism may be advantageously employed to elevate water which cannot be lifted by a suction pump placed at the surface, it being capable of efficient operation for elevating water from depths of hundreds of feet below the surface. By providing two anti-friction bearings such as the ball bearing at the top from which the shaft is suspended and the water-step at the bottom, we provide not only for properly supporting the drive shaft at the commencement of the operation of the pump, but also during its operation. When the pump is first started, there being little water in the well, the weight of the shaft and parts carried thereby is supported from the ball bearing at the top, but as soon as the water being pumped reaches the uppermost cylinder a portion of it passes through conduit 59 to the cylinder 33 and begins to relieve the shaft of downward pressure, the upward pressure thus caused increasing with the height of the water in the well until the downward pressure is neutralized,
Insert E³ as above stated.^
E³.

In figures 13, 14 and 15 we have illustrated one of our improved coupling devices for uniting the several sections of the well-tube or tubes and of the protecting tube or tubes and the devices for centering

[* Words and figures enclosed in brackets erased in copy.]

the pump shaft and the bearings therefor. As best shown in figures 13 and 14, 62 indicates a spider, the outer margin of which fits between the adjacent ends of adjoining sections of the well-tube 12, and is firmly clamped between them by a coupling sleeve 63 which draws the sections of the well-tube together, as shown in figure 13. The spider 62 is provided with a central sleeve 63^a, the upper and lower ends of which are externally screw-threaded to receive the adjacent ends of the tubes 38-39. Thus the sleeve 63^a serves to center the tubes 38-39 and held them properly in position. This is further secured by providing the spider 62 with depending webs 64, as shown in figures 13 and 15. The sleeve 63^a forms a bearing for the pump-shaft 19, which passes through it and is provided with a sleeve 65 which bears in the sleeve 63^a, the latter being provided with a lining 66 of babbit-- metal or other suitable anti-fraction material. The sleeve 65 is fixedly secured to the pump-shaft 19 by a rivet 67, or other suitable means, as shown in figure 13. Thus the wear is taken by the sleeve 65 instead of by the shaft, and the several parts are properly centered and held in position so that they cannot get out of alinement.

In figures 17, 18 and 19 we have shown a modified construction for the same purpose. In the construction therein shown we employ a spider 68 similar in many respects to the spider 62 since it has a central sleeve 69, which is screw-threaded and serves to unite the tubes 38-39 in the manner already described. It also is provided with a babbit-ed bearing 70, in which the pump-shaft 19 bears, and the latter is provided with the sleeve 65 in the same way as shown in figure 13. The spider 68, however, is of greater diameter than the well-tube 12 so that its margin projects beyond the outer surface of the well-tube and is engaged by coupling-rings 71-72 which are screwed, respectively, upon the lower end of the upper section and the upper end of the lower section of the well-tube, as shown in figure 17, and thus bear against the opposite faces of the projecting portion of the spider 18. The two rings 71-72 and the spider are all connected together by bolts 73 which pass through them, as shown in figure 17, thus firmly securing together the sections of the well-tube.

In figure 12 we have shown a modified arrangement of the driving mechanism for operating the pump and the mechanism for supporting and controlling the position of the pump-shaft. In the construction therein shown, 74 indicates a standard having laterally-projecting lugs 75, on which rests a casting 76 which carries certain devices for supporting and lubricating the pump-shaft 19. At the top of said casting 76 is provided a box 77 in which is placed a ball-bearing 78. Above said ball-bearing is a plate or disc 79 which is secured to the upper end of the shaft 19 so that it assists in supporting the weight of the shaft and transmits the same to the ball-bearing 78. 80 indicates a similar ball-bearing in the lower portion of the casting 76 which rests upon a sleeve or plate 81 which is also secured to the shaft 19 and transmits to the ball-bearing 80 the upward thrust of said shaft.

82 indicates an oil-chamber in the lower portion of the casting 76 with
Per A. and communicating by a duct 83 [in]* the interior of the bearing-box 77. 84 indicates a return duct leading from the box 77 to the chamber 82. 85 indicates a wheel or
101 disc secured to the plates 81 in the chamber 82 so that it rotates with the shaft 19 and serves by its rotation to force oil from the chamber 82 up through the duct 83 to the bearing-box 77 thereby lubricating the bearing 78 therein. The oil thus forced up to the box 77 returns through the duct 84 to the chamber 82 and thus is caused to circulate continuously as the pump-shaft 19 rotates. By this arrangement both ball bearings are constantly kept lubricated.

To further assist in supporting the pump-shaft and to regulate the point at which it works, we provide a water-governor comprising

Per E. a piston $_{\wedge}^{86}$ [85]* which is secured to the shaft 19 in any
" " suitable way, as by set-screws 86^a within a chamber 87
" " located a short distance above the outlet-pipe 13. Said
" " piston $_{\wedge}^{86}$ [85]* overlies a water-chamber 88 with which communicates a passage 89 supplied through a pipe 90 with water under pressure. The arrangement is such that water admitted through the pipe 90 presses upward
" " on the piston $_{\wedge}^{86}$ [85]*. Should the pressure of the water admitted increase above the normal the pressure on the
" " piston $_{\wedge}^{86}$ [85]* will raise the pump-shaft, thereby carry-
" " ing $_{\wedge}^{\text{said piston}}$ [it]* out of contact with the walls of the chamber 88 and permitting the water to escape into the chamber 87 through passages 91 and thence escape through an escape-pipe 92, which communicates with said chamber 87, as shown in figure 12. By this construction the pump-shaft rotates on a film of water, which further relieves it from friction and improves its operation.

93 indicates a motor for driving the shaft 19, said motor being mounted on top of the standard 74 and being connected with the shaft 19 by a flexible connection which insures the proper operation of the shaft even though it should get somewhat out of alinement with the motor. As shown in figure 12, 94 indicates the motor-shaft which carries at its lower end a coupling member 95 which engages a corresponding coupling-member 96 carried at the upper end of the pump-shaft 19. The coupling-member 95 carries a series of downwardly-projecting pins 97 which engage teeth 98 carried by the coupling member 96, so that the coupling-members interlock and insure the driving of the pump-shaft by the motor.

99 indicates a pipe which communicates with the tube 38 and is

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[* Words and figures enclosed in brackets erased in copy.]

used to admit water to the tube 38 to wet the shaft bearings and lubricate them before starting the pump.

Per G. In figures ^ [16, and 20 to 23]* we have shown a modified ar-

Per E. rangement of the ^ [runners turbine wheels].* In the construction shown in said figures, 100-101 indicate the upper and lower members of the pump cylinder section, the
102 upper member being provided with inclined blades or vanes 102, which are substantially the same as the blades 49 shown in figure 5. Arranged centrally in the upper section 100 and forming a bearing for the pump-shaft is a sleeve 103 having a lining 104 of babbit-metal, or other suitable material. The sleeve 103 corresponds with the sleeve 44 and is externally screw-threaded to receive the tube 38 or 39, as the case may be. 105 indi-

Per E. cates the ^ [runner water-wheel],* which is in many respects

" " similar to the ^ [runner wheel]* 52, and being provided with blades 106 which direct the water outward and upward against the blades 102, thereby causing it to rise through the cylinder. The wheel 105 is adapted to be secured to the pump-shaft in the manner already described, but the construction shown in figures 16 to 23 differs from the construction shown in the earlier figures principally in that bearings are provided for the

Per E. ^ [runner water-wheel]* above and below the blades 106. As

" " shown in figure 20, the ^ [runner water-wheel]* 105 is provided with an upwardly-projecting annular flange 107 above the blades 106, which has a bearing in the lower end of a conical shell 108 which extends down from the sleeve 103, as shown in figure 20. In like manner, at its lower

" " end the ^ [runner water-wheel]* is provided with a downwardly-

" " projecting flange 109 which has a bearing in an inwardly-projecting portion 110 of the lower member 101 of the pump cylinder, as shown in figure 20. Both the flanges 107 and 109 are provided with grooves 111

" " forming water-packing so as to permit the ^ [runner water-wheel]* to move up and down freely without loss of water. The advantage of this construction is that when pumping hard the twist upon the pump-shaft has a tendency to shorten the shaft, but when the strain is off the shaft is again elongated to its normal length. This lengthening and shortening of the shaft necessarily raises and

" " lowers the several [runners water-wheels]* which are connected

[* Words and figures enclosed in brackets erased in copy.]

with it, and consequently it is necessary to provide for
" " such movement of the ∧ runner [water-wheel].* Also there is
" " more or less tendency for the ∧ runners [water-wheels]* to rise and fall in normal pumping.

103 Per E.

So far as we are aware, we are the first in the art to employ centrifugal turbine mechanism for elevating water in deep wells, and our invention is, therefore, generic in character, and the claims are to be construed accordingly.

[Matter enclosed between rules erased in copy.]

That which we claim as our invention, and desire to secure by Letters Patent, is,—

Sub. A[1].

---

1. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, and means cooperating with said means for directing the water upward.

2. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, and stationary means carried by the cylinder and cooperating with said first-mentioned means for directing the water upward.

3. In a pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, inclined blades carried by the cylinder, and means carried by the shaft for throwing the water in the cylinder outward against said blades.

4. In a pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, inclined blades carried by the cylinder, and a wheel carried by said shaft, said wheel having inclined blades for throwing the water in the cylinder outward against said first mentioned blades.

5. In a pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, stationary inclined blades carried by the cylinder, and means carried by the shaft for throwing the water in the cylinder outward against said blades.

6. In a pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, stationary inclined blades carried by the cylinder, and a wheel carried by said shaft, said wheel having inclined

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[* Words and figures enclosed in brackets erased in copy.]

blades for throwing the water in the cylinder outward against said stationary blades.

7. In a pump, the combination of a pump cylinder, said cylinder having a plurality of series of inclined blades, a rotary shaft extending longitudinally in said cylinder, and a plurality of devices mounted on said shaft and acting to throw the water in said cylinder outward against said inclined blades.

8. In a pump, the combination of a pump cylinder, said cylinder having a plurality of series of stationary inclined blades, a rotary shaft extending longitudinally in said cylinder, and a plural-
101 ity of devices mounted on said shaft and acting to throw the water in said cylinder outward against said inclined blades.

9. In a pump, the combination of a pump cylinder, said cylinder having a plurality of series of inclined blades, a rotary shaft extending longitudinally in said cylinder, and a plurality of wheels mounted on said shaft, said wheels having inclined blades and acting to throw the water in said cylinder outward against said first-mentioned inclined blades.

10. In a pump, the combination of a pump cylinder, said cylinder having a plurality of series of stationary inclined blades, a rotary shaft extending longitudinally in said cylinder, and a plurality of wheels mounted on said shaft, said wheels having inclined blades and acting to throw the water in said cylinder outward against said stationary inclined blades.

11. In a deep-well pump, the combination of a cylinder, a rotary shaft extending longitudinally therein water-elevating means operated by the rotation of said shaft for delivering water from the well, and counterbalance means for relieving said shaft of the pressure of the column of water in the well.

12. In a deep-well pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, water-elevating means operated by the rotation of said shaft for delivering water from the well, and means for applying the pressure of the column of water in the well in an upward direction to the shaft to balance the downward pressure thereupon.

13. In a deep-well pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, water-elevating means operated by the rotation of said shaft for delivering water from the well, a piston connected with the lower end of said shaft, and means for applying the pressure of the water in the well to said piston from below.

14. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, means at the upper end portion of said shaft for suspending the same, and a bearing at the lower end of said shaft.

15. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, means at the upper end portion of said shaft for suspending the same, a bearing at the lower end of said shaft, and means for longitudinally adjusting said shaft.

16. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, means at the upper end portion of said shaft for suspending the same, a piston at the lower end of said shaft and a second cylinder in which said piston moves, said first-mentioned cylinder having a passage for admitting water from the well to said cylinder below the piston therein.

17. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, means at the upper end portion of said shaft for suspending the same, a piston at the lower end of said shaft, a second cylinder in which said piston moves, said first-mentioned cylinder having a passage for admitting water from the well to said second cylinder, and an opening in the bottom of said second cylinder.

18. In a pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, inclined blades, carried by the cylinder, a wheel carried by said shaft, said wheel having inclined blades for throwing the water in the cylinder outward against said first-mentioned blades, and upper and lower bearings for said wheel.

19. In a pump, the combination of a cylinder, a rotary shaft extending longitudinally therein, inclined blades carried by the cylinder, a wheel carried by said shaft, said wheel having inclined blades for throwing the water in the cylinder outward against said first-mentioned blades, upper and lower bearings for said wheel and grooves in said bearings and adapted to receive water from the well.

20. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, and means for moving the shaft vertically.

21. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, and water-actuated means for moving the shaft vertically.

22. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, a water-piston secured to the upper portion of said shaft, a water-chamber on which said piston is seated, and means for admitting water under pressure to said water-chamber.

23. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, a water-piston secured to the upper portion of said shaft, a water-chamber on which said piston is seated, means for admitting water under pressure to said water-chamber, and a discharge passage communicating with said water-chamber when said piston is lifted from its seat.

24. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, and cooperating ball bearings at the upper end of said shaft for taking the upward and downward end thrust of said shaft.

25. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-
106 mentioned means for directing the water upward, cooperating ball bearings at the upper end of said shaft for taking the upward and downward end thrust of said shaft, and means for automatically lubricating said bearings.

26. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, a bearing for the upper end of said shaft, and means for automatically lubricating said bearing.

27. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, a bearing for the upper end of said shaft, an oil-reservoir, a duct leading from said reservoir to said bearing, and means operated by said shaft for supplying oil from said reservoir to said bearing.

28. In a pump, the combination of a cylinder, a rotary shaft extending therein, means carried by said shaft for forcing the water in the cylinder outward, means cooperating with said first-mentioned means for directing the water upward, a motor, and a flexible coupling connecting said motor directly with said shaft.

29. The combination with a sectional well-tube, a shaft extending thereinto, a centering device fitted between abutting ends of said well-tube sections and having a bearing for said shaft, and means for connecting said well-tube sections together.

30. The combination with a sectional well-tube, a shaft extending thereinto, a centering device fitted between abutting ends of said well-tube sections and having a bearing for said shaft, means connecting said well-tube sections, together, and tubes within said well-tube and surrounding said shaft above and below said centering device, said inner tubes being connected with said centering device.

31. The combination of a sectional well-tube, a centering device having a central sleeve, said centering device being fitted between the adjoining ends of well-tube sections, means connecting the well-tube sections, together, and a pump-shaft extending through said sleeve and having a bearing therein.

32. The combination of a sectional well-tube, a centering device having a central sleeve, said centering device being fitted between the adjoined ends of well-tube sections, means connecting the well-

tube sections together, and a pump-shaft extending through said sleeve and having a bearing therein, said shaft having a sleeve secured thereto and having a bearing in said first-mentioned sleeve.

33. The combination of a sectional well-tube, a coupling sleeve secured upon the ends of said well-tube sections for securing them together, a spider fitted between the adjoining ends of the well-tube sections and having a central sleeve, and a pump-shaft having a bearing in said sleeve.

34. The combination of a sectional well-tube, a coupling sleeve secured upon the ends of said well-tube sections for securing them together, a spider fitted between the adjoining ends of the
107 well-tube sections and having a central sleeve, a pump-shaft having a bearing in said sleeve, and an inner tube within said well-tube sections and screwed upon the ends of said central sleeve around the shaft.

[Matter enclosed between rules erased in copy.]

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Witnesses:
HARRY WILLIAM SPILLER.
B. L. PALMER.

2–260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 2. J. L. D.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

F. H.

Department of the Interior,
United States Patent Office,
Washington, May 4, 1909.
Mailed " " "

Chapman & Chapman, care Bond, Adams, Pickard & Jackson, Monadnock Block, Chicago, Ill.:

Please find below a communication from the examiner in charge of your application, for Deep Well Pumps, filed March 10, 1909, Ser. No. 482,517.

E. B. MOORE,
Commissioner of Patents.

This application has been examined.

Lines 19 and 20 of page 14 appear incomplete. In Fig. 20 the

numeral 105 appearing near the top of the Figure should be *103*, and in Fig. 21, 105 should be *103*.

Claims 1, 2, 3, 5, 7, and 8 are rejected upon Ivens, #705,844, July 29, 1902, Pumps, Rotary Single Piston (Cent.).

Claims 4, 6, 9, 10, and 18 are rejected upon Ivens above cited, and Ivens, #682,939, Sept. 17, 1901, Artesian & Oil Wells, Drilling & Boring (Pumps, Rotary Single Piston, Cent.).

Claims 11, 12, and 13 are rejected upon Alvord, #735,691, Aug. 11, 1903, Pumps, Rotary Single Piston (Cent.)., the state-
108 ment in the last three lines of claims 12 and 113 that the pressure of the water in the well is applied to the piston being apparently inaccurate, as the pressure of the water in the pump itself is applied to the piston.

Claims 14 and 15 are rejected upon Park & Ries, #801,474, Oct. 10, 1905, Pumps, Rotary Single Piston (Cent.).

Claims 16, 25, and 26 are rejected upon Alvord and Park & Ries, both cited above. In connection with the last two lines attention is called to the above comment in connection with claims 12 and 13.

Claim 19 is rejected upon the two patents to Ivens above cited, and Alvord #735,692, Aug. 11, 1903, Pumps, Rotary Simgle Piston (Screw).

Claims 20 and 21 are rejected *are rejected* upon Ivenss #705,844 and Alvord #735,691, both cited above.

Claims 22 and 23 are rejected upon Ivens #705,844 above cited, and Moreau, #207,887, Sept. 10, 1878, Pumps, Rotary Single Piston (Cent.), and Stumpf, #783,153, Feb. 21, 1905, Steam Engines, Rotary Impact, Compound (Pumps, Rotary Single Pistton, Cent.).

Claim 24 is rejected upon Ivens #705,844 and Park & Ries, both cited above, and Eisler, #522,518, July 3, 1894, same classs.

There is not considered to be any patentable combinatiion between a centrifugal pump and a lubricating device for the shaafting, and claim 27 is therefore rejected under the Commissioner's decision in *ex parte* McNeil, 100 O. G., 1976. In connection with this claim attention is called to Ivens #705,844, and Park & Ries,, both cited above, and Coffman, #771,231, Oct. 4, 1904, Class 64—ssubclass 56. The lubricating device should be separately claimed.

Claim 28 is rejected upon Ivens #704,844 above cited, and Northam & Nolan, #633,478, Sept. 19, 1899, Electricity, Motive Power, Motors, and Howard, #777,373, Dec. 13, 1904, Water Distribution, Cocks and Faucets, Sliding Gates.

Claims 29, 30, 31, 33 and 34 are rejected upon Ellis, #819,986, May 8, 1906, Pumps, Rotary Single Piston (Cent.).

Claim 32 is rejected upon Ellis above cited, and Lager,, #865,504, Sept. 10, 1907, same class. Attention is called to the member 35 in the device of Lager.

Claim 17 is deemed allowable.

F. M. TRYON, *Ex.*

F. M. HOPKINS, *Ass't Ex.*

109 Mail Room, Apr. 29, 1910, U. S. Patent Office.

Division 9, Apr. 29, 1910, U. S. Patent Office.

Paper No. 3,

Amendment.

A.

United States Patent Office.

Room No. 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pump. Filed March 10, 1909. Serial No. 482,517.

April 27, 1910.

Hon. Commissioner of Patents.

SIR: In response to official letter of May 4, 1909, we hereby amend as follows:

The Examiner is respectfully requested to change the numeral 105 near the top of Fig. 20 to *103*, and also to change the numeral 105 in Fig. 21 to *103*.

Page 14, line 19, erase "in" and insert —*with*—

Erase the claims and insert,—

A¹. 1. In a pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, means carried by said shaft for elevating the water in the cylinder, a piston at the lower end of said shaft, and a second cylinder in which said piston moves, said first-mentioned cylinder having a passage for admitting water from the pump to said second cylinder below said piston.

A¹. 2. In a pump, the combination of a well-tube, a rotary shaft extending longitudinally therein, a plurality of pump cylinders communicating respectively with one another and with said well-tube cooperating devices carried by said shaft and said cylinders for forcing the water upward into the well-tube, a piston at the lower end of said shaft, a cylinder in which said piston moves, and means for admitting water from the pump to the latter cylinder.

3. In a pump, the combination of a well-tube, a rotary shaft extending longitudinally therein, a plurality of pump cylinders communicating respectively with one another and with said well-tube, cooperating devices carried by said shaft

and said cylinders for forcing the water upward into the well-tube, a piston at the lower end of said shaft, a cylinder in which said piston moves, means for admitting water from the pump to the latter cylinder, and means at the upper end portion of said shaft for suspending the same.

4. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, means at the upper end portion of said shaft for suspending the same, a piston at the lower end of said shaft, a second cylinder in which said piston moves, said first-mentioned cylinder having a passage for admitting water from the pump to said second cylinder, and an opening in the bottom of said second cylinder.

Per C.

---

5. In a pump the combination of a well-tube, a rotary shaft extending longitudinally therein, a cylinder communicating with said well tube, pumping mechanism operated by the rotation of said shaft, [and]* oppositely-disposed ball-bearings connected with the upper end portion of the shaft for supporting the same.

Per B.

Insert B'.

B'

[Matter enclosed between rules erased in copy.]

Sub. B².

A¹. 6. In a pump, the combination of a well-tube, a rotary shaft extending longitudinally therein, a cylinder communicating with said well-tube, pumping mechanism operated by the rotation of said shaft, means for supporting said shaft, a motor arranged above the upper end of said shaft, and a flexible connection connecting said motor with the shaft, said flexible connection comprising coacting coupling members connected respectively with said shaft and with said motor and having interlocking devices movably engaging one another.

7. In a pump, the combination of a well-tube, a rotary shaft extending longitudinally therein, a cylinder communicating with said well-tube, pumping mechanism operated by the rotation of said shaft, means for supporting said shaft, a motor arranged above the upper end of said shaft, and a flexible connection connecting said motor with the shaft, said flexible connection comprising coacting coupling members connected respectively with said shaft and with said motor and having interlocking teeth and pins movably engaging each other.

[Matter enclosed between rules erased in copy.]
[*Words and figures enclosed in brackets erased in copy.]

111 Per C.

8. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith and having inwardly-projecting inclined blades, a rotary shaft extending longitudinally in said well-tube and cylinder, a water-wheel connected with said shaft and rotating in said cylinder between said blades, ∧ (inclined) blades carried by said wheel, and bearings for said wheel above and below the latter blades.

Per B.

A'. 5c [9].* In a deep-well pump, the combination of a well-tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well-tube, a plurality of sleeve sections enclosing said shaft, and a coupling device coupling the several sections of the well-tube and said sleeve sections, said coupling device comprising a spider ∧ (upon which said sleeves are screwed) [having a screw-threaded connection with said sleeves],* said spider projecting between the adjacent ends of adjoining sections of the well-tube and [Insert B³.]* [means]* ∧ B³ for securing the sections of the well-tube ∧ (thereto) [at opposite sides of said spider].*

Per D.

Per B.

Per G. 6c [10].* In a deep-well pump the combination of a well-tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well-tube, a plurality of sleeve sections enclosing said shaft, a coupling device coupling the several sections of the well-tube and said sleeve sections, said coupling device comprising a spider having a screw-threaded connection with said sleeves, said spider projecting between the adjacent ends of adjoining sections of the ∧ D' [well-tube, means ∧ [thereto]* for securing the sections of [B³].* the well-tube ∧ at opposite sides of said spider, and]* a bearing carried by said spider for said shaft.

Sub [D'].*

Insert [B³].*

Per B.

Insert [D².]*>

B⁴.>

Insert B⁴.

[Matter enclosed between rules erased in copy.]
[* Words and figures enclosed in brackets erased in copy.]

In view of the foregoing amendment, reconsideration and the allowance of this application are respectfully solicited. The claims have been revised in view of the official action, and as now
112 presented are believed to be clearly distinguished from the references. The references do not show applicants' construction by which the pump shaft is balanced, and as the claims to this feature are now drawn more particularly to such construction, it is believed they will not be objected to.

Claim 4 is former claim 17, which was held to be allowable. Applicants' construction of oppositely-disposed bearings is also novel, and the same is true of their flexible connection between the motor and the pump shaft. The claims for these features also are now more specific, and as they clearly distinguish from the references they are believed to be allowable.

Claim 8 is drawn to applicants' construction of water wheel by which the bearings are provided at opposite sides of the blades, which construction is not shown in the references.

Claims 9 and 10 are drawn to applicants' spider for uniting the sections of the well-tube and also the sleeves which enclose the pump shaft, and as the references do not show this feature favorable action as to these claims is requested.

The specification has been amended to avoid the formal criticisms.

Applicants reserve the right to file a separate application for the lubricating mechanism.

Reconsideration and the allowance of the application are respectfully solicited.

Respectfully,

BOND, ADAMS, PICKARD & JACKSON,
Attys. for Applicants.

2–260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 4. G. D.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

B.

Department of the Interior.
United States Patent Office,
Washington, June 4, 1910.
Mailed " " "

Chapman & Chapman, care Bond, Adams, Packard & Jackson, Chicago, Ill. (Monadnock Bldg.):

Please find below a communication from the Examiner in charge of your application for Deep Well Pumps, filed Mar. 10, 1909, Ser. No. 482,517.

E. B. MOORE,
Commissioner of Patents.

113 This application has been considered as amended Apr. 29, 1910.

Claim 5 is rejected on Northam, #633,475, Sept. 19, 1899, Pumps, Rot. Sing. Piston, (Screw), in view of either Robion, #778,148, Dec. 20, 1904, (121-Motors, Vehicles), or Fig. 7 of Gillespie, #611,472, Sept. 27, 1898, (64-49).

Claims 6 and 7 are rejected on Wilken, #776,711, Dec. 6, 1904, 103-Rot. Sing. P. (Sc.), and Sprague, #385,211, June 26, 1888, (172, 36) Xref. in Rot. Cent. Box, in view of Sperry, #562,500, June 23, 1896, (64-13), Box Op. Dev.

Claim 8 is rejected on Ivens, #705,844, of record in view of either Park & Ries of record, or Ward, #776,573, Dec. 6, 1904, 103-R. S. P. (S).

Claims 9 and 10 are rejected on Owen, #916,583, Mar. 30, 1909, R. S. P. (C), and Matin, #433,990, Aug. 12, 1890, 103-Oper. Dev., in view of the adjusting spider shown in Watson, #140,977, (64-25) July 15, 1873, and Carey, #322,898, July 28, 1885, (64-8) Op. Dev. Box.

Claims 1 to 4 may be allowed as at present advised.

F. M. TRYON, *Ex.*

F. W. B.

Mail Room,
Sep. 30, 1910,
U. S. Patent Office.

Division 9, Paper No. 5,
Oct. 1, 1910,
U. S. Patent Office.

United States Patent Office.

Room No. 142.

Hon. Commissioner of Patents:

SIR: In the matter of the application of Matthew T. Chapman and Mark C. Chapman, Serial No. 482,517, filed March 10, 1909, for Improvements in Deep Well Pumps, in which a Power of Attorney has been given by said applicants to Bond, Adams, Pickard and Jackson (a firm composed of A. H. Adams, C. E. Pickard and J. L. Jackson) of the City of Chicago, Illinois, each of the undersigned members of said firm hereby enters his appearance as attorney for said applicants.

A. H. ADAMS.
C. E. PICKARD.
J. L. JACKSON.

114 Mail Room,
Apr. 24, 1911,
U. S. Patent Office.

Division 9, Paper No. 6,
Apr. 25, 1911,
U. S. Patent Office.

Amendment.

B.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pump, Filed March 10, 1909, Serial No. 482,517.

April 21, 1911.

Hon. Commissioner of Patents.

SIR: In response to official letter of June 4, 1910, we hereby amend as follows:

√Claim 5, line 4, erase "and"

√at the end of the claim insert

Per C.

B¹. *—a lubricant receptacle below the lower ball-bearing, and means for supplying lubricant from said receptacle to said ball-bearings—*

[Matter enclosed between rules erased in copy.]

√Erase claims 6 and 7 and insert,—

Per C.

B². 6. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith and having inwardly-projecting inclined blades, a rotary shaft extending longitudinally in said well-tube and cylinder, a tube surrounding said shaft, a water-wheel connected with said shaft and rotating in said cylinder between said blades, blades carried by said wheel, and bearings for said wheel above and below the latter blades.

B². 7. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith and having inwardly-projecting inclined blades, a tapered sleeve within said cylinder and forming therewith an upwardly and inwardly inclined annular channel, a rotary shaft extending longitudi-

nally in said well-tube and cylinder, a water-wheel
115 connected with said shaft and rotating in said cylinder between said blades, and blades carried by said wheel.

[Matter enclosed between rules erased in copy.]

√Claim 8, line 6, before "blades" (second occurrence) insert —*inclined*—

√Claims √9 and √10, line 9, erase "means" and insert

Sub. D¹ in cl. 10, B² in cl. 9, per G.

—*coupling-rings outside of the well-tube and secured to the spider at opposite sides of the projecting portion thereof*—

[Matter enclosed between rules erased in copy.]

" " " " √line 10, erase "at opposite sides of said spider" and insert —*thereto*—

Insert the following claim,—

B⁴. 5. *g.* [7ᶜ, 11, 8*d*.]* In a pump, the combination of a well-
sectional
Per D. tube, a ∧ cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, a sleeve in said well-tube surrounding said shaft, means carried by said shaft for elevating the water in the
shaft
Per C. cylinder, a bearing for the lower end of said ∧
formed integral with the cylinder sections and
Per D. [cylinder],* and a duct ∧ [in said cylinder]* extending from above said water-elevating means to said bearing.

E⁴.> Insert E⁴.

In view of the foregoing amendment, reconsideration and the allowance of this application are respectfully solicited. Claim 5 has been amended to include the element of means for supplying lubricant to the bearings, and as this feature appears to be novel with applicants it is believed the claim will now be found to be allowable. New claim 6 includes the sectional sleeve surrounding the pump-shaft in combination with the well-tube and the cylinder and water-elevating devices. Claim 7 includes applicants' guides which cooperate with the cylinder to form the inclined water passages, and claim 8 has been amended to include the inclined blades carried by the

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[*Words and figures enclosed in brackets erased in copy.]

water-wheel, and these claims are therefore believed to be clear of the prior art and to be for allowable subject-matter. Claim 9 has been amended to specify applicants' construction of coupling rings cooperating with the spider, and so also has claim 10. This con-
116 struction is not shown in the references. New claim 11 is in general similar to claim 1, but includes the sleeve which encloses the pump-shaft and the duct leading to the lower bearing. The application is now believed to be in condition for *allowable*, and favorable action is accordingly respectfully solicited.

Respectfully,

BOND, ADAMS, PICKARD & JACKSON,
Attys. for Applicants.

2–260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 7. G. D.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

B.

Department of the Interior,

United States Patent Office,

Washington, May 11, 1911.
Mailed " " "

Chapman and Chapman, care Bond, Adams, Pickard & Jackson, Monadnock Bldg., Chicago, Ill.:

Please find below a communication from the examiner in charge of your application for Deep Well Pumps, filed Mar. 10, 1909, Ser. No. 482,517.

E. B. MOORE,
Commissioner of Patents.

This application has been considered as amended Apr. 24, 1911.

Claim 5 is specific to Fig. 12, while the remaining claims in the case read only on Fig. 1, or Figs. 1 and 16 and division is therefore required.

Claim 5 is examinable in Div. 12, under the class of Lubricators, and no action is attempted on the merits of the claim, attention being called to Northam, Robion, Coffman and Gillespie, all of record, as showing the state of the art within the knowledge of the examiner.

Claims 6, 7 and 8 are rejected on Alvord, Park & Reis and Ward, all of record.

Claims 9 and 10 state nothing requiring invention over Owen, Martin, Ellis, Watson and Carey all of record, and are re-
117 jected thereon, attention further being called to Ruff & Irwin, #789,629, May 9, 1905, Pumps, Sol. Recip. Piston, in connection with these claims.

In lines 5 and 6 of claim 11, the words "a bearing for the lower end of said cylinder" are apparently inaccurate and should be revised. The claim is considered as directed to patentable subject matter.

F. M. TRYON, *Ex.*

F. W. B.

Mail Room,
Apr. 10, 1912.
U. S. Patent Office.

Division 9,
Apr. 10, 1912,
U. S. Patent Office.

Paper No. 8.

Amendment.

C.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pump, Filed March 10, 1909, Serial No. 482,517.

April 8, 1912.

Hon. Commissioner of Patents.

SIR: In response to official letter of May 11, 1911, we hereby amend as follows:

Erase claims 5, 6, 7 and 8.

Claim 11, line 6, erase "cylinder" (first occurrence) and insert —*shaft*—

Change the numbers of the claims accordingly.

In view of the foregoing amendent, reconsideration and the allowance of this application are respectfully solicited. Claim 5 is withdrawn in deference to the requirement of division, applicants reserving the right to file a separate application for the subject-matter of said claim.

With regard to claims 9 and 10, attention is called to the fact that they are for a specific arrangement of coupling devices as shown in Fig. 17, in which the spider projects between the adjacent ends

of adjoining sections of the well-tube and couplings are secured to such projecting portions. This is not shown in the references. Probably the nearest of the references cited is patent to Martin, which shows a spider the outer margin of which is flush with the surfaces of the adjoining sections of the well-tube and a sleeve is screwed upon the well-tube and the spider. This, however, is not the same thing as applicants' construction, in which the spider projects out
118 beyond the outer surfaces of the well-tube sections and has the coupling rings secured to it and to the well-tube sections. It is believed these claims should be allowed on reconsideration.

The allowance of the application is respectfully solicited.

Respectfully,

BOND, ADAMS, PICKARD & JACKSON,
Attys. for Applicants.

2–260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 9. J. L. D.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

B.

Department of the Interior,

United States Patent Office,

Washington, May 10, 1912.
Mailed " " "

Chapman & Chapman, care Bond, Adams, Pickard & Jackson, Monadnock Block, Chicago, Ill:

Please find below a communication from the examiner in charge of your application for Deep Well Pumps, filed March 10, 1909, Ser. No. 482,517.

E. B. MOORE
Commissioner of Patents.

This application has been considered as amended April 10, 1912.

Claims 5 and 6 are rejected on the coupling members 10 and 12 shown in Ellis, of record, and the bearing plate *d* and flanged sections *n* shown in Wiesenbach, #669,209, Mar. 5, 1901, Machine Elements, Cranks and Wrist Pins (Pumps, Elements, Operating Devices).

Claim 7 is rejected on the lubricating connections 26 and 30 shown in Eisler, of record, and the connection 21 shown in Rateau, #742,-231, Oct. 27, 1903, Pumps, Rotary Single Piston (Cent.), on the ground that it did not require invention to place the conduits 26 of Eisler or 21 of Rateau in the pump casing. An encased shaft is shown in Ellis, of record.

F. M. TRYON, *Ex.*

F. W. B.

119 Mail Room,
Jul. 13, 1912,
U. S. Patent Office.

Division 9,
Jul. 15, 1912.
U. S. Patent Office.

Paper No. 10.

Power of Attorney.

United States Patent Office.

Div. No. 9, Room No. 142.

In the Matter of the Application of Matthew T. Chapman & Mark C. Chapman for Letters Patent for Improvements in Deep Well Pumps. Filed March 10, 1909. Serial No. 482,517.

The undersigned having heretofore appointed the firm of Bond, Adams, Pickard & Jackson (composed of A. H. Adams, C. E. Pickard and J. L. Jackson) of the City of Chicago, Illinois, our Attorneys in the matter of the above entitled application, and said Power of Attorney having lapsed by the death on the 24th day of June, 1912, of the said C. E. Pickard,—

Now Therefore, the undersigned hereby appoints as our Attorneys in the matter of said application A. H. Adams and J. L. Jackson, of the City of Chicago, Illinois, (doing business under the firm name and style of Adams & Jackson, Reg. No. 89), with power of association, substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

July 6, 1912.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Mail Room,
Apr. 30, 1913,
U. S. Patent Office.

Division 9, Paper No. 11,
May —, 1913,
U. S. Patent Office.

Amendment.

D.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pumps. Filed March 10, 1909. Ser. No. 482,517.

April 28, 1913.

Hon. Commissioner of Patents.

SIR: In response to Office letter of May 10, 1912, we hereby amend as follows:—

120 Claim 5, lines 6 and 7, cancel "having a screw-threaded *connected* with said sleeves," and insert *—upon which said sleeves are screwed—*

Claim 6, lines 9 and 10, cancel "well-tube, coupling-rings outside of the well-tube and secured to the spider at opposite sides of the projecting portion thereof for securing the sections of the well-tube thereto and" and insert—

Per G.

---

17. *well-tube, coupling-rings screwed upon the outside of the sections of well-tube respectively, means for securing said coupling-rings to the annular projecting portion of said spider, and—*

[Matter enclosed between rules erased in copy.]

Insert the following claim:

Per G.

D². 7. In a deep well pump the combination of a well-tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well-tube, a plurality of sleeve sections enclosing said shaft, and a coupling device coupling the several sections of the well-tube and said sleeve sections, said

D². coupling devices comprising a spider having a tapered centering seat upon one of said sections of well-tube, said sleeves being screwed upon said spider, said spider projecting between the adjacent ends of adjoining sections of the well-tube, coupling rings screwed upon the outside of the sections of well-tube respectively, and means for securing said coupling rings to the annular projecting protion of said spider.

[Matter enclosed between rules erased in copy.]

Claim 7, line 2, before "cylinder" insert —*sectional*—

Claim 7, line 6, erase "in said cylinder" and insert —*formed integral with the cylinder sections and*—

Change the number of claim 7 to 8.

In view of the foregoing amendments reconsideration and an allowance of this application are respectfully requested. Former claim 5 has been amended to call for the sleeves which enclose the shaft being screwed upon the spider. Former claim 6 has been

121 amended to call for the particular form of coupling-ring shown and described. New claim 7 is drawn along the line of claims 5 and 6, but limited to the form of spider shown, including the tapered wings which hold the spider centered relative to the lower section of well tube. It is submitted that these claims are now free of the references in terms as well as in substance.

Claim 7 has been amended to differentiate it from the references, which do not show the sectional cylinder with the duct formed integral therewith.

Favorable action is respectfully requested.

Respectfully,

ADAMS & JACKSON,
Att'ys for Applicants.

2–260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 12. J. L. D.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

B.

Department of the Interior,

United States Patent Office,

Washington, May 29, 1913.
Mailed " " "

Adams & Jackson, Monadnock Block, Chicago, Ill.:

Please find below a communication from the Examiner in charge of the application of Chapman & Chapman for Deep Well Pumps, filed Mar. 10, 1909, Ser. No. 482,517.

E. B. MOORE,
Commissioner of Patents.

This application has been considered as amended Apr. 30, 1913.

Claims 5, 6, and 7 are rejected on Ellis and Wiesenbach, both of record, and Bowers, #442,947, Dec. 16, 1890, Class 137-28. The substantial equivalent of applicant's combined coupling, shaft bearing, and guide vane member is shown in Ellis, while in Wiesenbach is shown a flanged connection having a diaphragm member extending between the flanges, and applicants' pipe coupling members 71 and 72 are old and well known in the art, as shown in Bowers.

122 Pipe connections are commonly made with a tapered thread, and to taper the hub of applicants' spider, it is held, is within the range of mechanical skill and did not require invention.

Claim 8 may be allowed as at present advised.

F. M. TRYON, *Ex.*

F. W. B.

Mail Room,
May 18, 1914,
U. S. Patent Office.

Division 9, Paper No. 13,
May 18, 1914,
U. S. Patent Office.

Amendment.

E.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pump. Filed March 10, 1909. Serial No. 482,517.

May 15, 1914.

Hon. Commissioner of Patents.

SIR: In response to official letter of May 29, 1913, we hereby amend as follows:

Page 3, line 12, erase "water-wheel" and insert —*impeller*—
line 20 erase "water-wheels" and insert —*runners or impellers*—
line 22, erase "turbine" and insert *runner*—
Page 4, lines 2 and 3, erase "turbine wheels" and insert —*runners*—
line 5, erase "turbine wheels" and insert —*runners*—
line 7, erase "stepped" and insert —*mounted*—
line 12 erase "turbine wheels" and insert —*runners*—
line 17, after "motor" insert

E'. —*and is vertically adjustable to compensate for wear, as hereinafter described*—

Page 6, line 18, after "lowered" insert —*to compensate for wear, as hereinafter described*—
123 line 22 erase "stepped" and insert —*mounted*—
line 23, erase "carried" and insert —*supported*—
Page 9, line 7, erase "turbine wheels" and insert —*pump runners or impellers*—
line 10, erase "wheels" and insert —*runners*—

line 15, erase "wheel" and insert —*runner*—
line 17, erase "turbine" and insert —*runner*—
line 19, erase "turbine wheels" and insert —*runners*—
Page 10, line 6, erase "wheel" and insert —*runner*—
line 8, erase "water wheel" and insert —*runner*—
line 10, erase "turbine wheel" and insert —*runner*—
line 11, erase "turbine wheels" and insert —*runners*—
line 14, erase "wheel" and insert —*runner*—
lines 15, 16, and 19, erase "turbine wheel" and insert —*runner*
Page 11, line 8, erase "water wheel" and insert —*runner*.
Page 11, line 19, after "the piston 35" insert—

E². *The cylinder 33 and piston 35 also enclose and protect the lower bearing 31.*—

Page 12, line 11, after "stated" insert—

E³. In the operation of pumps of this character there is considerable wear between the runners and the coacting stationary portions of the cylinders in which they are mounted, and to maintain the efficiency of the pump, it is necessary to
E³. compensate for this wear. In our improved pumping apparatus this is accomplished by means of the adjusting plate or nut 26 which screws upon the head 27. By adjusting this nut, the pump-shaft 19 may be adjusted vertically so as to maintain the runners in the most effective relation to the cylinders in which they operate. The bearing 31 at the lower end of the pump-shaft permits of this adjustment and also prolongs the life of the pump by properly holding the lower end of the pump-shaft in position and there-
124 by preventing lateral displacement of the pump runners while in operation.

Page 15, lines 7, 10, 14, 15, erase "85" and insert —*86*
line 8, erase "86" and insert —*86ª*—
line 16, cancel "it" and insert —*said piston*

Page 16, line 14, erase "turbine wheels" and insert —*runners*—

Page 16, line 24, erase "water wheel" and insert —*runner*—

line 25, erase "wheel" and insert —*runner*—

Page 17, lines 6, 7, 11-12, 17, 24-25, erase "water wheel" and insert —*runner*—

lines 23, and 25-26, erase "water wheels" and insert —*runners*—

Erase the matter on page 18.

Insert the following claims:

E⁴. Per H. 6ᵍ [9].* In a vertical pump of the type described, the combination with a pump-shaft and one or more runners carried thereby, of a bearing for the pump-shaft below the lowermost runner, and means for vertically adjusting the pump-shaft.

Insert g^2.>

[Matter enclosed between rules erased in copy.]

Per G.

E⁴. 10. In a vertical pump of the type described, the combination with a pump-shaft and one or more runners carried thereby of a bearing for the pump-shaft below the lowermost runner, and a screw-adjustment for moving the pump-shaft vertically.

11. In a vertical pump of the type described, the combination of a pump-shaft and one or more runners mounted thereon, means adjustable suspending the shaft from above, and a bearing for the lower end portion of the shaft below the lowermost runner carried thereby.

125 12. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, and a bearing for centering the lower end portion of the pump-shaft, said bearing being in the water-supply passage of the pump.

13. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for the pump-shaft below the lowermost runner, said bearing being located in the water-supply passage of the

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[* Words and figures enclosed in brackets erased in copy.]

pump, and radial arms connected with the bearing for holding the same centrally in the water-passage.

14. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for centering the lower end portion of the pump-shaft, said bearing being in the water-supply passage of the pump, and means for vertically adjusting the pump-shaft to compensate for wear.

15. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing below the lowermost runner for centering the lower end portion of the pump-shaft, a bearing above the uppermost runner, and a tube surrounding the pump-shaft above the uppermost runner for preventing substances carried by the water from coming in contact with the latter bearing.

16. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing below the lowermost runner for centering the lower end portion of the pump-shaft, a bearing above the uppermost runner, a tube surrounding the pump-shaft above the uppermost runner for preventing substances carried by the water from coming in contact with the latter bearing, and means for vertically adjusting the pump-shaft to compensate for wear.

E[4]. 17. In a pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for the pump-shaft below the lowermost runner for centering the shaft, and means protecting said bearing.

18. In a pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for the pump-shaft below the lowermost runner for centering the shaft, means protecting said bearing, and means for vertically adjusting the pump-shaft.

[Matter enclosed between rules erased in copy.]

6[h] [10[g], 19].* In a pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for the pump-shaft below the lowermost runner for centering the shaft, and means substantially enclosing said bearing for protecting the same.

126 Per G.

---

20. In a pump of the type described, the combination of a pump-shaft, a plurality of runners mounted thereon, cylinders in which said runners operate, and adjustable means for raising or lowering the pump-shaft and runners to adjust the runners in their respective cylinders.

[Matter enclosed between rules erased in copy.]
[*Words and figures enclosed in brackets erased in copy.]

F⁴. 7ʰ [11ᵍ, 21].* In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for the pump-shaft below the lowermost runner, and means enclosing and protecting said bearing, said protecting means having an opening at the bottom for the escape of sand.

8ʰ [12ᵍ, 22].* In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing above the uppermost runner, a tube surrounding the pump-shaft above the uppermost runner, said tube having one or more perforations to admit water to said upper bearing, and means for straining the water passing through said perforation or perforations.

Per G.

---

23. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, said pump-shaft being adjustable vertically, a water-pressure-operated governor at the upper end portion of said pump-shaft for supporting and adjusting the same, and a bearing at the lower end portion of said pump-shaft.

Insert F²>

F².

[Matter enclosed between rules erased in copy.]

In view of the foregoing amendment, reconsideration and the allowance of this application are respectfully solicited. A number of corrections have been made to the specification to avoid some informalities and to point out more fully the function of some of the parts.

With regard to claims 5, 6 and 7, it is respectfully submitted that they are not met by the references and should be allowed. Claim 5 calls for a coupling device comprising a spider upon which the sleeves are screwed. The Ellis patent cited against this feature does not show this construction, since the Ellis device does not provide for screwing the sleeves upon the hub portion of the spider, but
127 screws them to collars which are themselves screwed to the spider. Thus the Ellis connection is not a direct one between the sleeves and the spider, but is made through two intermediate collars. A comparison of applicants' Fig. 17 with the construction shown in the Ellis patent will clearly show the difference. Again, the claim calls for the spider projecting between the adjacent ends of adjoining sections of the well-tube and coupling rings outside of the well-tube and secured to the spider at opposite sides of the projecting portions thereof. This is not true of the Ellis construction. In the latter the coupling of the outer tube 1 is effected altogether by the thimble 12,

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[* Words and figures enclosed in brackets erased in copy.]

and the spider has nothing whatever to do with it, since the spider does not project beyond the outer surface of the tube 1, but terminates between the abutting ends of the tube sections. In applicants' construction the spider projects through, and to a considerable distance beyond, the outer surfaces of the well-tube sections, and the coupling rings are bolted to the ends of the spider and are screwed to the well-tube sections. It is respectfully submitted that there is very little similarity between the construction of this claim and what is shown in the Ellis patent. The Weisenbach patent is cited as showing a flanged connection having a diaphragm member extending between the flanges. This is not claimed broadly by applicants, and it is difficult to see what bearing this reference has on the claim. The Bowers patent cited shows merely coupling rings connected by bolts, but applicants do not claim this broadly but only in connection with the spider arranged as specifically recited in the claim. The same remarks apply to claims 6 and 7, which are also specific, claim 7 being even more specific in that it recites the spider having a tapered centering seat. It is respectfully submitted that these claims should all receive favorable consideration.

Upon a further study of the case, applicants believe they are entitled to the additional claims herewith presented, which have been drawn after careful consideration of the references cited and are believed to be clearly distinguished from the prior art.

The allowance of the application is accordingly respectfully solicited.

Respectfully,

ADAMS & JACKSON.
Att'ys for Applicants.

128 Mail Room.
May 25, 1914.
U. S. Patent Office.

Division 9,
May 26, 1914.
U. S. Patent Office.

Paper No. 14.

Supplemental Amendment.

F.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pump. Filed March 10, 1909. Serial No. 482,517.

May 23, 1914.

Hon. Commissioner of Patents.

SIR: We hereby amend as follows:

Page 10, line 18, before "bearings" insert —*shaft*—

line 19, erase "of the upper runner"

line 23, after "tube." insert

F.[1] —When the pump is in operation, water from the discharge passage enters tube 39 through the screen and lubricates the shaft bearings above the perforations as well as below them, since the pressure in said tube is the same as that in the well-tube 12. When the pump is not in operation, the water settles back and flows out through the perforations in the tube 39 and through the screen 58, thereby cleansing the screen of any matter accumulated on it. Inasmuch as the perforations 57 and the screen 58 are practically at the lower end of the
F[1] tube 39, when the pump is stopped all the water in said tube passes out.—

Insert G[1]. G[1].

Insert the following claims:

Per G.

F[2]. 24. In a deep well pumping mechanism, the combination of a downwardly-extending power-shaft, pumping means carried thereby, said shaft being driven from above, and a fluid-operated bearing located near the top of said shaft, said shaft being suspended from said bearing.

25. In a deep well pumping mechanism, the combination of a downwardly-extending power shaft, pumping
129 means carried thereby, said shaft being driven from above, a fluid-operated bearing located near the top of said shaft, said shaft being suspended from said bearing, and means for supplying fluid under pressure to said bearing.

26. The combination with a well-casing, of a rotary pump located therein below the surface of the earth, said pump comprising a power-shaft driven from the top, and a liquid-operated bearing located at the surface, said bearing supporting the weight of said shaft.

[Matter enclosed between rules erased in copy.]

9^h [13^g, 27].* In a vertical pump of the type described, the combination of a well-tube forming a water-discharge passage, a pump-shaft in said well-tube, one or more runners carried thereby, a bearing for said shaft, a tube surrounding the pump-shaft adjacent to said bearing, said tube having one or more perforations to admit water to said bearing, and means for straining the water passing through said perforation or perforations.

F². 10^h [14^g, 28].* In a vertical pump of the type described, the combination of a well-tube forming a water-discharge passage, a pump-shaft in said well-tube, one or more runners carried thereby, a bearing for said shaft, a tube surrounding the pump-shaft adjacent to said bearing, said tube having one or more perforations to admit water to said bearing, and means for straining the water passing through said perforation or perforations, said straining means being in said water-discharge passage.

11^h [15^g, 29].* In a vertical pump of the type described, the combination of a well-tube forming a water-discharge passage, a pump-shaft in said well-tube, one or more runners carried thereby, a bearing for said shaft, a tube surrounding the pump-shaft adjacent to said bearing, said tube having one or more perforations to admit water to said bearing, and means adjacent to the lower end of said tube for straining the water passing through said perforation or perforations.

Insert G^3.>

Upon further consideration, applicants believe they are entitled to the claims herewith presented in addition to those already included in the case. From a careful inspection of the references and of the prior art, it appears that the subject-matter of these claims is novel, and it is therefore believed they should receive favorable consideration.

It is noted that on our photographs of Fig. 1 there is no leader from the number 58 which is used in the specification to designate the screen which overlies the perforations 57. It is difficult from the photographs to determine whether or not the screen 58 is
130 shown, and if it does not appear on the original drawings, the Examiner is respectfully requested to amend Fig. 1 to show a screen overlying said perforations 57 and in close contact with the outer surface of the pipe 39.

Respectfully.

ADAMS & JACKSON.
Attorneys for Applicants.

2-260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

[* Words and figures enclosed in brackets erased in copy.]

Paper No. 15. J. L. D.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

B.

Department of the Interior,

United States Patent Office,

Washington, June 27, 1914.
Mailed " " "

Adams & Jackson, Monadnock Block, Chicago, Ill.:

Please find below a communication from the examiner in charge of the application of Chapman & Chapman, for Deep Well Pumps, filed Mar. 10, 1909, Ser. No. 482517.

THOMAS EWING,
Commissioner of Patents.

This application has been considered as amended May 18, and May 25, 1914.

Attention is called to the fact that this case is among those to which the Commissioner's Order #2107, of Mar. 12, 1914, is directed.

Relative to the proposed correction of Fig. 1 of the drawing applicants should file a sketch of the proposed correction for the approval of the Examiner, and instructions directing the correction should be embodied in a separate letter. See Rule 9 and the Commissioner's Order No. 2112 of Mar. 30, 1914.

Claims 5, 6, and 7 are readable only on Figs. 16 and 17; claims 9, 10, 11, 14, 15, 16, 22, 27, 28, and 29, on Fig. 1; claims 12, 13, 17, 18, 19, on Figs. 1 and 16, and claims 23 to 26 on Fig. 12. All claims in the case should read upon a single construction. See the Commissioner's decision in *ex parte* Welch, 93 O. G., 2104.

131 The last office action on claims 5, 6, and 7 is repeated.

Claims 9, 10, 11, 14 to 19, and 21 state nothing requiring invention over Fig. 7 of Ivens, #705,844, in view of the vertically adjustable step bearing shown in either Wilken or Park & Ries, both of record, and are rejected.

Claims 12 and 13 are rejected on Fig. 7 of Wilken of record.

Claim 20 is rejected on Jackson of record in view of the adjustable step bearing shown in Park & Ries of record.

Claims 23 to 26 are rejected as not patentable over the fluid pressure operated supporting piston 10, etc., shown in Jackson, of record, and the analogous adjustable supporting means shown in Snow, #669,601, Mar. 12, 1901, (Pumps, Rotary, Open Screw).

Claims 22, 27, 28, and 29 may — allowed as at present advised.

Claims 1 to 4 inclusive and claim 8 stand allowed as at present advised.

F. M. TRYON, *Ex.*

F. W. B.

Mail Room,
Jan. 12, 1915,
U. S. Patent Office.

Division 9, Paper No. 16,
Jan. 13, 1915,
U. S. Patent Office.

Amendment.

G.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pumps, Filed Mar. 10, 1909, Ser. No. 482,517.

Jan. 9, 1915.

Hon. Commissioner of Patents.

SIR: In response to Office letter of June 27, 1914, we hereby amend as follows:—

Page 10, after the matter inserted in line 23 by the amendment dated May 23, 1914, insert the following:

G[1]. As will be readily understood by those acquainted with the action of centrifugal pumps, water rising from the rotary water raising elements into the lower end of the well tube 12 has a rapid swirling or rotating movement, by reason of which the sand and sediment carried up by the water is forced by centrifugal force toward the outside away from the screen 58, whereby the purifying effect of the said screen is greatly enhanced.

132 Page 16, line 13, cancel "16 to 23" and insert —*16, and 20 to 23*,—

Cancel claims 5, 6 and 7, and change the numerals of former claims 8 and 9 to *5* and *6*, respectively.

Insert the following claims:—

Per H.

G[2]. 7. In a pump, the combination of a water discharge casing, a vertical shaft journaled therein, water-raising means operatively connected with said shaft and actuated by the rotation thereof, means for rotating said shaft, an anti-friction bearing mounted on said shaft above said driving means and held against movement longitudinally with said

shaft, and means for adjusting said anti-friction bearing and said shaft vertically relative to said water discharge casing.

8. In a pump, the combination of a water discharge casing, a vertical shaft journaled therein, water-raising means operatively connected with said shaft and actuated by the rotation thereof, means for rotating said shaft, and mechanism adjustable independently of said water discharge casing during the operation of the pump for raising or lowering said shaft to compensate for wear upon the water-raising means.

9. In a pump, the combination of a water discharge casing a vertical shaft journaled therein, water-raising means operatively connected with said shaft and actuated by the rotation thereof, means for rotating said shaft, and stationary adjusting means adapted to be adjusted independently of said water discharge casing during the rotation of said shaft for raising or lowering the shaft to compensate for wear upon the water raising means.

[Matter enclosed between rules erased in copy.]

√ √ √ √ √ √

Cancel claims 10 to 18, inclusive, claim 20, and claims 23 to 26, inclusive, and change the numerals of claims 19, 21, 22, 27, 28 and 29, to *10* to *15*, respectively.

Insert the following claims:

G³. 12ʰ [16].* The combination with the pump casing, the impeller therein, a shaft bearing carried by the pump casing a line shaft passing through said bearing and carrying said impeller, a pump head, means forming a water conduit and for suspending said pump casing from said pump head, a head bearing member through which said line shaft projects, said head bearing member being mounted on said pump head, a driving pulley on said line shaft, a line shaft casing extending from the pump casing to the pump head and means for effecting a circulation of clear well water from the water conduit through said line shaft casing.

133

13ʰ [17].* In a centrifugal pumping apparatus the following elements in combination, a centrifugal pump, a line shaft for the pump, a discharge duct from the pump to the top of the well through which said shaft passes, a shaft casing for closing said shaft off from the rising column of water in said discharge duct, and means for effecting a circulation of well water inside such shaft casing.

14ʰ [18].* The combination of a well casing, a rotary pump therein, a pump shaft, a casing enclosing said shaft from the rising column of water in the well, means for freeing a portion of the rising column of well water from sand

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[* Words and figures enclosed in brackets erased in copy.]

and detritus and passing the water so freed into said shaft casing.

G³. 15ᵇ [19]*. In a well mechanism, in combination with a rotary pump, a pump shaft, a casing surrounding the shaft from the pump to the top of the well, to protect said shaft from the rising column of well water, and means for purifying a portion of said well water and delivering it into the shaft casing.

16ᵇ [20]*. In a pumping apparatus having a water discharge passage, the combination of a shaft rotatable in said passage, a bearing for said shaft separated from said water discharge passage, and a screen covering a port between said shaft and said water discharge passage adapted to filter water permitted to pass to said bearing for lubricating purposes.

17ᵇ [21]*. In a pumping apparatus, the combination of a water discharge casing, a shaft extending therethrough, a shaft casing located in said water discharge casing separating said shaft therefrom, means for rotating said shaft, means operatively connected with said shaft for forcing water upward through said water discharge casing, a bearing for said shaft in said shaft casing, and a screen covering a port in the wall of said shaft casing below the level of the water about said shaft casing during the pumping operation, said screen being adapted to filter water permitted to pass into said shaft casing for the purpose of lubricating said bearing.

18ᵇ [22]*. The combination of a well casing, a pump shaft therein, a casing enclosing said shaft from the rising column of water in the well, means for rotating said shaft, and means actuated by the rotation of said shaft for forcing water upward through said well casing and for giving the water a swirling movement as it passes the lower end of said shaft casing whereby the sand or other sediment carried by the water is directed by centrifugal force away from said shaft casing at its lower end, said shaft casing having a port leading thereinto near its lower end for admitting water thereto.

134

G³. 19ᵇ [23]*. The combination of a well casing, pump shaft therein, a casing enclosing said shaft from the rising column of water in the well, means for rotating said shaft, means actuated by the rotation of said shaft for forcing water upward through said well casing and for giving the water a swirling movement as it passes the lower end of said shaft casing whereby the sand or other sediment carried by the water is directed by centrifugal force away from said shaft casing at its lower end, said shaft casing having a port leading thereinto near its lower end for admitting

[*Words and figures enclosed in brackets erased in copy.]

water thereto, and means for straining the water entering said shaft casing.

20[b] |24|* The combination of a well casing, a pump shaft therein, a casing enclosing said shaft from a rising column of water in the well, means for rotating said shaft, said shaft casing having a port leading thereinto for admitting water thereto, and means actuated by the rotation of said shaft for forcing water upward through said well casing and for giving the rising water a swirling movement as it passes said port whereby the sand or other sediment carried by the water is directed by centrifugal force away from said port.

G[a]. 21[b] |25|*. In a pumping apparatus, the combination of a water discharge casing, a shaft extending therethrough, a shaft casing located in said water discharge casing separating said shaft therefrom, means for rotating said shaft, means operatively connected with said shaft for forcing water upward through said water discharge casing, and means for purifying a portion of the water pumped and delivering it into said shaft casing near its lower end adapted to discharge the water from the shaft casing upon the cessation of the operation of the pump.

In view of the foregoing amendments a reconsideration and an allowance of this application are respectfully requested. By another letter of even date the changes in the drawing requested by the amendment dated May 23, 1914, have been authorized and requested as required by the Office letter and a photographic copy of the sheet of drawings is sent for filing as is required by the rules. The divisions required by the Office letter have been made, all of the claims now in the case being readable upon the construction shown in Fig. 1. Applicants do not by their cancellation of former claims 5, 6 and 7, and former claims 23 to 26, inclusive, abandon the subject matter of such claims, but reserve the right to insert claims covering such subject matter in any other suitable
135 application or applications they have or may have on file.

It is believed that the office is in error in its rejection of claims 9 to 21, inclusive, on the references cited. The number of claims, however, has been materially reduced, it being believed that the claims retained will sufficiently protect applicants in the use of their novel construction. Former claim 9 (now claim 6) is believed to be clearly allowable over the references inasmuch as no one of the references shows or suggests the combination called for by the claim. It is true, of course, that one reference shows one part and another reference shows another part, but it has been held repeatedly by the courts that the mere fact that the structure of the combination claim might be built up from elements of prior patents does not in any way negative patentability. Moreover, the bearing 1[c] of Ivens is not adapted for use in connection with adjusting means for the shaft. The specification speaks of the pump shaft 3 being seated in the bearing 1[c]. In other words, the bearing at the

[*Words and figures enclosed in brackets erased in copy.]

lower end seems to be the means relied upon for holding the runner out of contact with the casing. The shaft does not seem to be adapted to have any downward adjustment and if it were adjusted upward the mechanism as a whole would be disorganized thereby. It is submitted that this claim should not be rejected upon the references cited nor upon any references which fail to disclose the combination called for.

New claims 7, 8 and 9 are similar to former claim 9, above referred to, in that each of said new claims calls for an adjustability of the pump shaft. It is believed that these new claims will be seen to be clearly free of the references. In connection with these claims especial attention is called to the Park & Ries patent, 801,474. In the construction there shown an anti-friction bearing is mounted upon a screw-threaded support 15, making it appear possible that the shaft is adapted to be adjusted up and down by the screwing up or down of the part 15. It is believed, however, that no such adjustment was intended and that no such adjustment is practically possible in the construction shown by the patent. The plate 15 serves as the upper closure member for the water discharge casing and it must, therefore, be screwed to the end of the threads in the casing 4 in order to prevent leakage. If an adjustment were attempted by a change in the position of the part 15 the structure would be rendered faulty and highly objectionable by reason of the water which would be forced out past the part 15. Moreover, in the Park & Ries construction there is no occasion whatever for a vertical adjustment of the shaft 1. The runner 31-34 is rotated in the cylinder 2 with no part of the cylinder in frictional contact with the runner, and there is no occasion for any adjustment of the runner up and down either for the purpose of providing proper working conditions or for the purpose of compensating for wear. Claim 7 is differentiated in terms from said Park & Ries construction by reason of calling for the anti-friction bearing being mounted on the shaft above the shaft driving means. It is believed that claims 8 and 9 will also be found to be sufficiently differentiated in terms from said Park & Ries patent to warrant their allowance.

136 We are unable to understand on what theory former claims 19 and 21 were held to be met in any way by the patents to Ivens, Wilkin and Park & Ries. No one of these patents shows a bearing below the lowermost runner with means tending in any way to protect such bearing from the sand carried up by the water. It is believed that these two claims must have been rejected by mistake, inasmuch as they are clearly free of the patents and free of any combination of the patents which might be suggested. It is believed that these claims will be found to be allowable.

It is believed that new claims 16, 17, 18 and 19 will be found to be clearly allowable in this application. These are the claims submitted by the Patent Office in the application of Sperry, Serial No. 744,430, for the purpose of probable interference, with the exception that the word "down" is omitted from the claim herewith presented as claim 17, the claim thus calling for a circulation through the

shaft casing rather than for a circulation down through the shaft casing. As is set forth in the argument accompanying the amendment of even date herewith in the Sperry application referred to, no interference is desired between the Sperry application and this application inasmuch as it is conceded by Sperry that the applicants herein are the prior inventors of the subject matter shown and described in this application.

New claims 20 and 21 are claims which were allowed in the said Sperry application, being Sperry's original claims 23 and 24. Inasmuch as these claims clearly read upon the construction of this application it is believed that such claims should be allowed herein.

It is believed that there will be no objection to the allowance of new claims 22, 23 and 24. And it is likewise believed that new claim 25 will be found to be allowable over any prior reference in the case.

In view of the several amendments which have been presented in this application presenting additional claims, it is deemed advisable that a supplemental oath be filed, and such an oath is presented herewith carrying the date of the invention of the structure of the claims as they now stand back to the time of filing the application.

Favorable action is respectfully requested.

Respectfully,

ADAMS & JACKSON,
Attorneys for Applicants.

Mail Room,
Jan. 12, 1915,
U. S. Patent Office.

Supplemental Oath.

STATE OF ILLINOIS,
County of Kane, ss:

Matthew T. Chapman and Mark C. Chapman, whose application for letters patent for improvements in Deep Well Pumps,
137 Serial No. 482,517, was filed in the United States Patent Office on or about the 10th day of March, 1909, being duly sworn, depose and say that they have read the claims of the said application as such claims stand as presented or affected by the amendment of even date herewith and by the amendments dated, respectively, April 27, 1910, April 21, 1911, April 8, 1912, April 28, 1913, May 15, 1914, and May 23, 1914; that the subject matter of the said claims was part of their invention, was invented before they filed their original application, above identified, for such invention, was not known or used before their invention, was not patented or described in a printed publication in any country more than two years before their said application, was not patented in a foreign country upon an application filed more than twelve months prior to their said application,

was not in public use or on sale in this country for more than two years before the date of their said application, and has not been abandoned.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.

Subscribed and sworn to before me this 9th day of January, 1915.
[SEAL.] FRED B. SHEARER,
Notary Public.

2-260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

J. L. D.

Paper No. 17.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

B.

Department of the Interior,

United States Patent Office,

Washington, January 20, 1915.
Mailed " " "

Adams & Jackson, Monadnock Block, Chicago, Ill.:

Please find below a communication from the Examiner in charge of the application of Chapman & Chapman, for Deep Well pumps, filed Mar. 10, 1909, Ser. No. 482,517.

THOMAS EWING,
Commissioner of Patents.

1:38 This application has been considered as amended Jan. 12, 1915.

Claims 6 and 7 state nothing requiring invention over Ivens #705,844, in view of the thrust bearing construction shown in Park & Ries, both of record, and are rejected thereon.

Claims 8 and 9 are rejected as not patentable over the thrust bearing construction shown in Park & Ries, of record.

Claims 10, 11, and 16 to 25 inclusive may be allowed as at present advised.

Claims 1 to 5 inclusive and claims 12 to 15 inclusive stand allowed.

This rejection is made final in view of the practice established under the Commissioner's decision in *ex parte* Miller, 150 O. G., 827.

The matter of a possible interference will be considered later.

F. M. TRYON, *Ex.*

F. W. B.

Account.

Mail Room,
Jan. 12, 1915,
U. S. Patent Office.

Division 9,
Jan. 25, 1915,
U. S. Patent Office.

Paper No. 18.

Amendment.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent for Deep Well Pumps. Filed March 10, 1909. Serial No. 482,517.

Jan. 9, 1915.

Hon. Commissioner of Patents.

SIR: The Office is respectfully requested to correct Fig. 1 of the drawings sustantially as shown in red ink upon the photographic copy of sheet 1 enclosed herewith, so as to show more clearly the screen 58 mounted about the lower end of the shaft casing 39. The office is also respectfully requested to cancel the numeral 85 from Fig. 12. where it is used to indicate a piston upon the shaft 19. and to substitute therefor the numeral *86*; and to change the numeral 86 in said figure, as it is used to indicate set screws for holding said piston in position, to *86a*.

Charge the cost of these changes, if any, to our account.

Respectfully,

ADAMS & JACKSON,
Attorneys for Applicants.

[Endorsed:] Adams & Jackson. C. U. S. Patent Office. Number 8643. Received Jan. 12, 1915. Chief Clerk. Received in Div. C. Jan. 13, 1915. For Div. 9, 1-23-15 Corrected. No charge. Jan. 27, 1915. To Div. 9.

Print filed with Paper #18, same as Patented Drawing.

(Here follows diagram marked p. 139.)

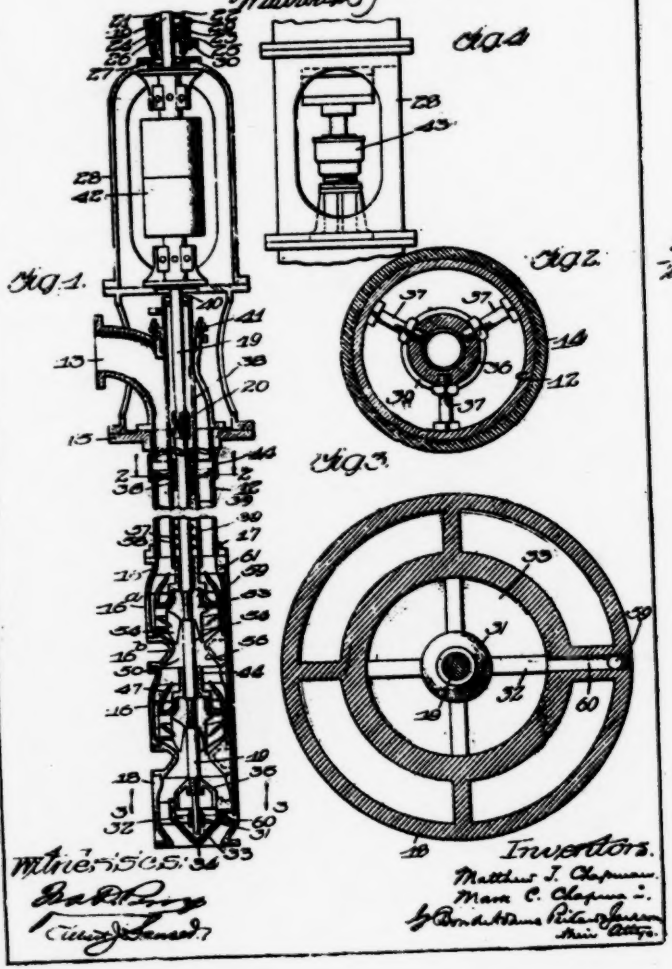
712,517 Pat. Mar. 7, 1902.

Class 103. PUMPS.

Chapman & Westbrook Single Piston.

No. 456.

Chapman & Westbrook $ 139



23
28

195

Patent Appeal Docket No. 1132.

Westbrook
v.
Chapman, et al.

page 86.

86

139

140 2–079.

Interference.

Intf. "A."

Interference No. 38430, Paper No. 18.

Name-, Matthew T. Chapman & Mark Chapman.
Serial No. 482,517.
Title, Deep Well Pumps.
Filed, March 10, 1909.
Interference with Marvin B. Van Ness.
Decisions of—
Primary Examiner, ——, dated, ——.
Ex'r of Interferences, Favorable, dated, April 16/15.
Board, ——, dated, ——.
Commissioner, ——, dated, ——.

Remarks.

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This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

141 2–213.

Forwarded from Div. IX to Examiner of Interferences Jan. 29, 1915.

Paper No. 19.

[Interference.]

Intf. "A."

Department of the Interior,

United States Patent Office,

Washington, D. C., —— —, 190-.

U. S. Patent Office,
Interference Division.
Feb. 2, 1915,
Mailed.

Adams & Jackson, Monadnock Block, Chicago, Ill.:

Please find below a copy of a communication from the Examiner

concerning the application of Chapman & Chapman, for "Deep Well Pumps," filed Mar. 10, 1909, Ser. No. 482,517.

Very respectfully,

THOMAS EWING,
Commissioner of Patents.

Room No. 142.

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

38430.

Your case, above referred to, is adjudged to interfere with others, hereafter specified, and the question of priority will be determined in conformity with the Rules.

The statement demanded by Rule 110 must be sealed up and filed on or before *the* March 8, 1915, with the subject of the invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is:

1. The combination with the pump casing, the impeller therein, a shaft bearing carried by the pump casing, a line shaft passing through said bearing and carrying said impeller, a pump head, means forming a water conduit and for suspending said pump casing from said pump head, a head bearing member through which
142 said line shaft projects, said head bearing member being mounted on said pump head, a driving pulley on said line shaft, a line shaft casing extending from the pump casing to the pump head and means for effecting a circulation of clear well water from the water conduit through said line shaft casing.

2. In a centrifugal pumping apparatus the following elements in combination, a centrifugal pump, a line shaft for the pump, a discharge duct from the pump to the top of the well through which said shaft passes, a shaft casing for closing said shaft off from the rising column of water in said discharge duct, and means for effecting a circulation of well water inside such shaft casing.

3. The combination of a well casing, a rotary pump therein, a pump shaft, a casing enclosing said shaft from the rising column of water in the well, means for freeing a portion of the rising column of well water from sand and detritus and passing the water so freed into said shaft casing.

4. In a well mechanism, in combination with a rotary pump, a pump shaft, a casing surrounding the shaft from the pump to the top of the well, to protect said shaft from the rising column of well water, and means for purifying a portion of said well water and delivering it into the shaft casing.

The interference involves your application above identified and an application for "Centrifugal Pumping Mechanism," filed by Marvin B. Van Ness, of Welsh, Louisiana, whose attorneys are Fred G. Dieterich & Co., of Washington, D. C.

The relation of the counts of the interference to the claims of the respective parties is as follows:

Counts.	Van Ness.	Chapman & Chapman.
1	1	16
2	14	17
3	6	18
4	7	19

P. D. HASKELL,
Acting Ex'r.

F. W. B.

143 2–260.

Div. 9, Room 142.

Address only "The Commissioner of Patents, Washington, D. C."

J. L. D. Paper No. 22.

All communications respecting this application should give the serial number, date of filing, and title of invention.

B.

Department of the Interior,

United States Patent Office,

Washington, May 25, 1915.
Mailed " " "

Adams & Jackson, Monadnock Block, Chicago, Ill.:

Please find below a communication from the Examiner in charge of the application of Chapman & Chapman, for Deep Well Pumps, filed Mar. 10, 1909, Ser. No. 482,517.

THOMAS EWING,
Commissioner of Patents.

Interference No. 38,430, in which this application was involved having been terminated, and decision rendered in favor of applicants, this case now awaits action in response to Office action dated Jan. 20, 1915.

F. M. TRYON, *Ex.*

F. W. B.

Mail Room,
Jun- 24, 1915,
U. S. Patent Office.

Division 9, Paper No. 23,
Jun- 25, 1915,
U. S. Patent Office.

Amendment.

H.

United States Patent Office.

Div. 9, Room 142.

In the Matter of the Application of Chapman & Chapman for Patent on Deep Well Pumps. Filed March 10, 1909. Serial No. 482,517.

June 22, 1915.

Hon. Commissioner of Patents.

SIR: In response to Office letter of May 25, 1915, we hereby amend
V V V V V
by canceling claims 6, 7, 8, and 9, and by changing the numerals of the remaining claims accordingly.

144 In view of the foregoing amendment which meets fully the requirements of the Office letter, an allowance is very respectfully requested.

Respectfully,

ADAMS & JACKSON,
Attorneys for Applicants.

2–181.

J. B. W.

Serial No. 482,517.

Address only the Commissioner of Patents, Washington, D. C.

Department of the Interior,
United States Patent Office,
Washington, June 30, 1915.

Matthew T. Chapman and Mark C. Chapman.

SIR-: Your application for a patent for an improvement in Deep well pump filed Mar. 10, 1909, has been examined and allowed.

The final fee, twenty dollars, must be paid not later than six months from the date of this present notice of allowance. If the final fee be not paid within that period, the patent on this application will be withheld, unless renewed with an additional fee of $15, under the provisions of Section 4897, Revised Statutes.

The office delivers patents upon the day of their date, and on which their term begins to run. The printing, photolithographing and engrossing of the several patent parts, preparatory to final sign-

M. T. & M. C. CHAPMAN.

DEEP WELL PUMP.

APPLICATION FILED MAR. 10, 1909.

1,149,633.

Patented Aug. 10, 1915.

8 SHEETS—SHEET 1.

456. Chapman & Wentworth } 146

Fig. 1.

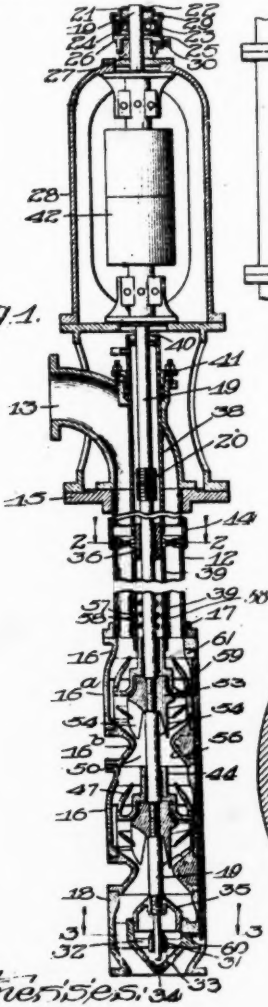


Fig. 4.

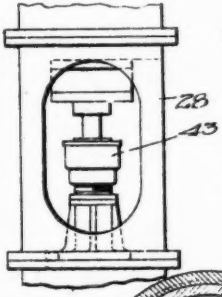


Fig. 2.

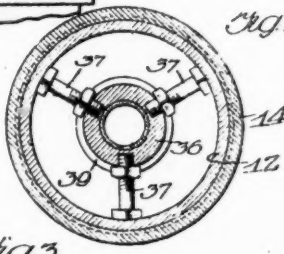
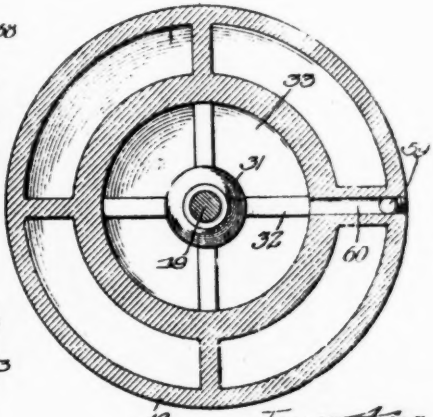


Fig. 3.



Witnesses:

Inventors:

Matthew J. Chapman

Mary C. Chapman

by Bond & Thomas Richard Jones

their Atty

58

M. I. & M. C. CHAPMAN.

DEEP WELL PUMP.

APPLICATION FILED MAR. 10, 1909.

1,149,633.

Patented Aug. 10, 1915.

3 SHEETS—SHEET 2.

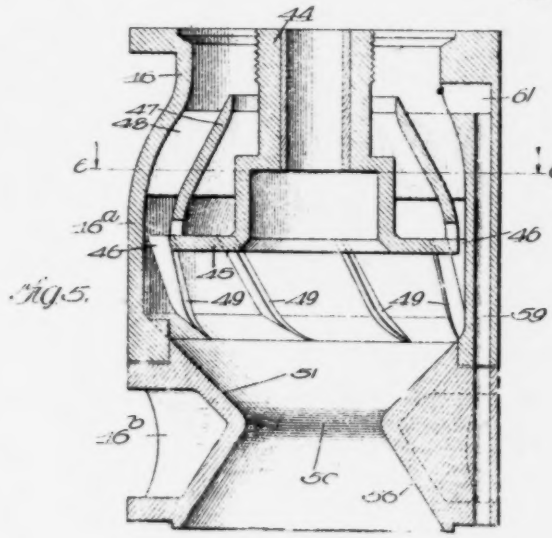


Fig. 5.

456
Chapman
v.
Wintroath
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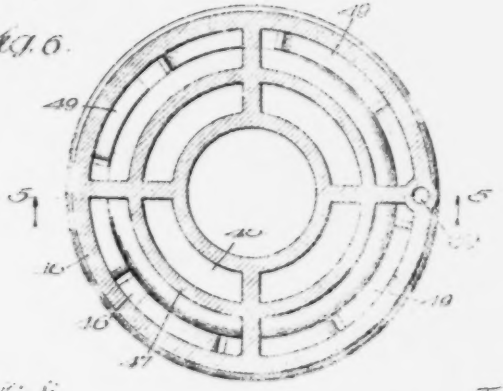


Fig. 6.

Witnesses:

Inventors:

59

M. T. & M. C. CHAPMAN.

DEEP WELL PUMP.

APPLICATION FILED MAR. 10, 1905.

1,149,633.

Patented Aug. 10, 1915.

3 SHEETS—SHEET 3.

456
Chapman
Mudgett
1148

Fig. 7.

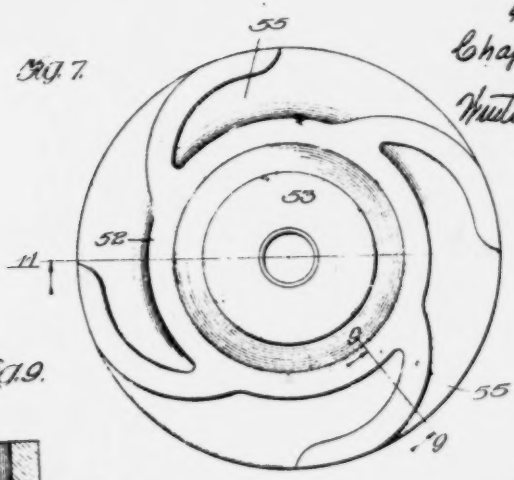


Fig. 9.

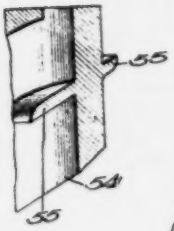
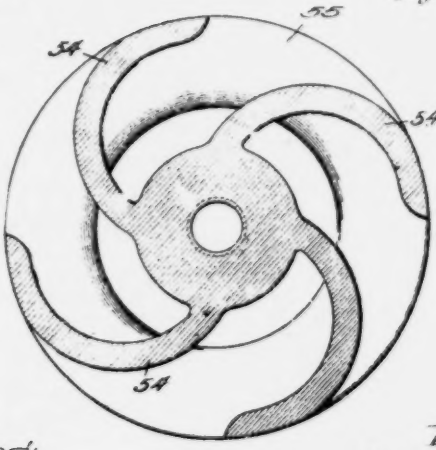


Fig. 8.



Witnesses:
Bartlett
Edward J. Lamed

Inventors.
Matthew T. Chapman,
Mark C. Chapman,
by Bartlett Thum Pritchard & Lamed
their attys.

60

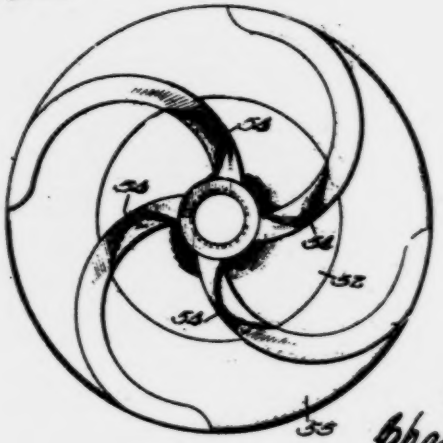
M. T. & M. C. CHAPMAN.
DEEP WELL PUMP.
APPLICATION FILED MAR. 10, 1909.

1,149,633.

Patented Aug. 10, 1915.

8 SHEETS—SHEET 4.

Fig. 10.



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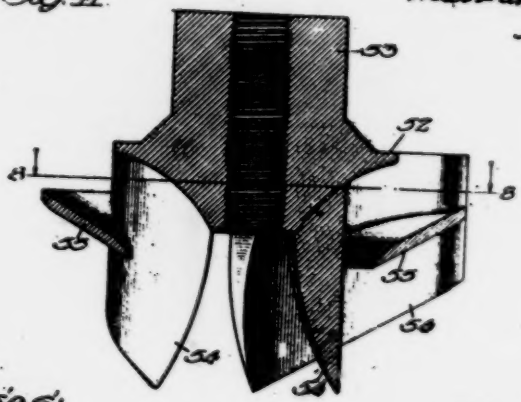
Chapman
Mutreath
7 Claims

Fig. 11.



Witnesses:

Inventors.
Matthew T. Chapman,
Mary C. Chapman,
by Bond Adams, Pickard & Lucas,
their Attys.

61

456
Chapman of Nutbrook p/60

M. T. & M. C. CHAPMAN.
DEEP WELL PUMP.
APPLICATION FILED MAR. 10, 1909.

1,149,633.

Patented Aug. 10, 1915.
6 SHEETS—SHEET 5.

Fig. 12.

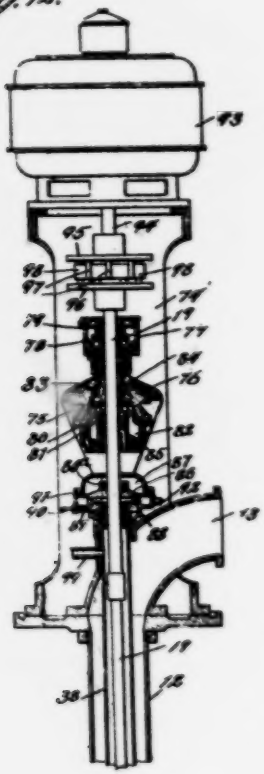


Fig. 13.

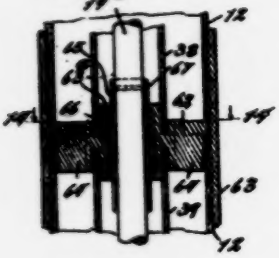
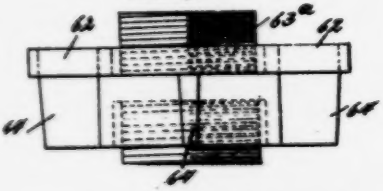


Fig. 14.

Fig. 15.



Witnesses:
Jos. D. Bell
Alex. J. Smith

Inventors
Matthew J. Chapman,
Mann C. Chapman.
by Bond & Bond & Richard Jarman,
their Attys.

456.
Chapman v Weltroath } p 151.

M. T. & M. C. CHAPMAN.
DEEP WELL PUMP.
APPLICATION FILED MAR. 10, 1909.

1,149,633.

Patented Aug. 10, 1915.
8 SHEETS—SHEET 6.

Fig. 16.

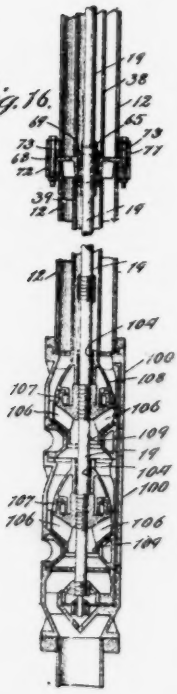


Fig. 17.

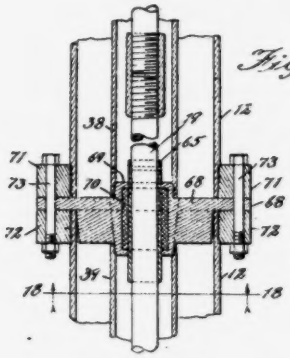


Fig. 18.

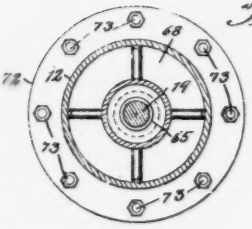
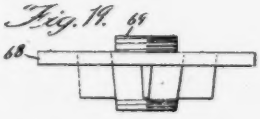


Fig. 19.



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M. T. & M. C. CHAPMAN.

DEEP WELL PUMP.

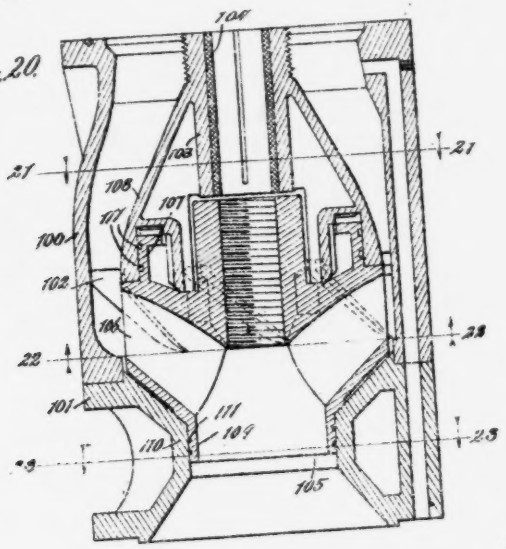
APPLICATION FILED MAR. 10, 1909.

Patented Aug. 10, 1915.

8 SHEETS—SHEET 7.

1,149,633.

Fig. 20.



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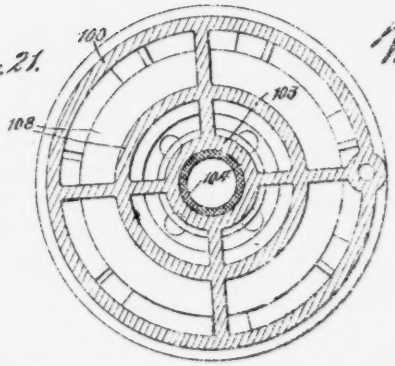
Chapman v. Westbrook

Fig. 21.



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DEEP WELL PUMP.
APPLICATION FILED MAR. 10, 1909.

Patented Aug. 10, 1915.
8 SHEETS—SHEET 8.

Fig. 22.

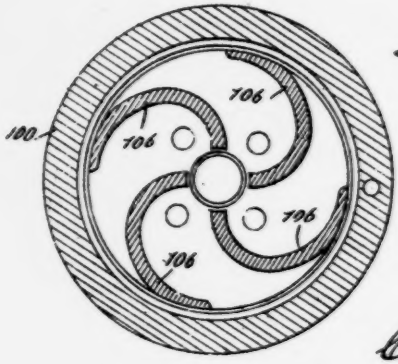

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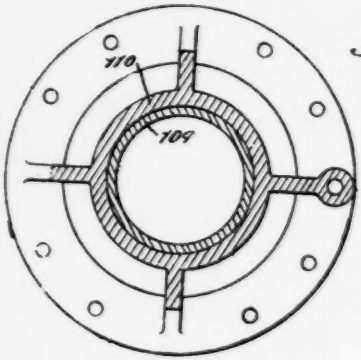
Fig. 23.



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UNITED STATES PATENT OFFICE.

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DEEP-WELL PUMP.

1,149,633. Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed March 10, 1909. Serial No. 482,517.

To all whom it may concern:

Be it known that we, MATTHEW T. CHAPMAN and MARK C. CHAPMAN, citizens of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Deep-Well Pumps, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to pumps for raising water from deep wells, and has to do more particularly with pumps of the centrifugal type.

The object of our invention is to provide a new and improved pump by which a larger amount of water may be pumped in a given time or by a given expenditure of power. To this end, it consists in the improvements hereinafter described and pointed out in the claims.

In the accompanying drawings,—Figure 1 is a sectional view, illustrating our improved pump; Fig. 2 is a cross-section, on line 2—2 of Fig. 1, illustrating the means for centering and supporting the shaft bearings; Fig. 3 is a section on line 3—3 of Fig. 1, illustrating the construction of the lower end portion of the pumping mechanism; Fig. 4 is a view, showing a motor for driving the operating pump; Fig. 5 is an enlarged detail, being a vertical section on line 5—5 of Fig. 6, illustrating the stationary portion of the water-elevating mechanism; Fig. 6 is a cross-section on line 6—6 of Fig. 5; Fig. 7 is a plan view of the rotary portion of the water-elevating mechanism; Fig. 8 is a horizontal section on line 8—8 of Fig. 11; Fig. 9 is a detail, being a partial section on line 9—9 of Fig. 7; Fig. 10 is an inverted plan view of the part shown in Fig. 7; Fig. 11 is a vertical section on line 11—11 of Fig. 7; Fig. 12 is a partial sectional view showing the upper portion of the pump; Fig. 13 is a vertical section showing a modified construction of the coupling devices; Fig. 14 is a horizontal section on line 14—14 of Fig. 13; Fig. 15 is an enlarged side view of the spider shown in Figs. 13 and 14; Fig. 16 is a vertical section showing a modification; Fig. 17 is an enlarged vertical section showing still another construction of the coupling devices; Fig. 18 is a cross-section on line 18—18 of Fig. 17; Fig. 19 is a side view of the form of spider shown in Figs. 17 and 18; Fig. 20 is an enlarged sectional view of a modified form of pump-cylinder and impeller; Fig. 21 is a cross-section on line 21—21 of Fig. 20; Fig. 22 is a cross-section on line 22—22 of Fig. 20, looking up; and Fig. 23 is a cross-section on line 23—23 of Fig. 20, looking down.

Our improved pumping mechanism is in the nature of a centrifugal turbine pump, since one or more runners or impellers in the nature of turbine wheels are employed in connection with fixed inclined blades to force the water up, the runner blades acting by their rotation to throw the water outward against the stationary inclined blades and thereby compel it to rise through the pump cylinder. Suitable provision is made to counteract the downward pressure on the runners so that such pressure is neutralized soon after the pump is put in service. The several runners are mounted on a common shaft vertically disposed in a suitable cylinder, its lower end being mounted in a bearing which centers and guides it. Intermediate guides and bearings are also provided, and at the lower end of the shaft there is a water piston which is fitted in a suitable cylinder, to which water is admitted under pressure equal to that of the column of water upon the runners, the water below said water piston acting in an upward direction so as to substantially neutralize the downward pressure of the water in the pump cylinder, thus causing the shaft to rotate freely. The shaft is rotated by power applied to it near its upper end, either by a belt or by a direct-connected motor and is vertically adjustable to compensate for wear, as hereinafter described. The upper portion of the pump shaft is inclosed by a sleeve or tube so that the water in the well does not reach it, the water being discharged through a suitable outlet which connects with the upper end of the pump cylinder.

Referring to the drawings for a description of the particular embodiments of our invention therein illustrated,—12 indicates a tube, which, for convenience, will be termed the well-tube as it extends down into the well and forms a conduit for conducting the water raised up to the surface where it is discharged through an elbow or other outlet 13 which, as shown in Figs. 1 and 12, connects with the upper end of the

well-tube 12. It will be understood that the well-tube is made up of any desired number of sections which may be united by plain couplings 14 shown in Fig. 1, but are best united by our improved couplings hereinafter described.

Referring now more particularly to the construction shown in Figs. 1 to 11, 15 indicates a base-plate which supports the portions of the mechanism which are above ground, as shown in Fig. 1.

16 indicates several tubular sections, which will be termed "pump cylinders", since the pumping mechanism operates in them. Any suitable number of pump cylinders may be employed, depending on the depth of the well, the volume of water to be pumped, or the quantity of water to be pumped in a given time. Said sections are alike and are fitted together so that the several units when united serve to make up a sectional pump cylinder. The several sections may be secured together in any suitable way, as by bolts. They are adapted to be lowered into the well, the uppermost cylinder 16 being secured to the end of the well-tube preferably by means of a screw collar 17 which screws upon the lower end of the well-tube 12.

18 indicates a bottom section or cylinder, which is secured to the lowermost cylinder 16 and is provided with a bearing for the lower end of the shaft, as will be hereinafter described.

19 indicates the pump shaft, which is a vertically-disposed shaft mounted centrally in the well-tube and extending from above the ground down to the bottom section 18. Said shaft is preferably solid, but may be tubular, if desired, and is composed of sections united by couplings 20, as shown in Fig. 1. At its upper end it is provided with a nut 21 preferably secured thereto by a set-screw 22, as shown in Fig. 1, said nut bearing on a top bearing-plate 25 which rests on bearing-balls 24 which in turn rest on a plate 25 carried by an adjusting-plate 26. Said adjusting-plate 26 screws upon a head 27, which in turn is carried by a framework 28 resting on the base-plate 15. Thus it will be seen that the shaft 19 is suspended upon the balls 24 by means of the nut 21. The latter is preferably provided with a cap 29 which incloses and protects the ball bearings resting on the upper ledge of the adjusting-plate 26. By screwing the adjusting-plate 26 up or down, obviously the shaft 19 may be raised or lowered to compensate for wear, as hereinafter described. In order to lock the adjusting-plate 26 in its different positions, a set-screw 30 is provided, as shown in Fig. 1, but any other suitable means for the purpose may be employed.

The lower end of the shaft 19 is mounted in a bearing sleeve 31 carried by radial arms 32 supported by the bottom section 18, as best shown in Figs. 1 and 3, said arms being in the lower portion of a cylinder 33, which is provided in said section 18, as shown. The lower portion of said cylinder is tapered downwardly and inwardly toward the center where an opening 34 is provided to permit sand and other similar particles to escape. The upper portion of said cylinder receives a piston 35 which fits it closely and moves vertically therein, said piston being secured upon the lower end of the shaft 19. The function of the piston 35 will be hereinafter set forth.

36 indicates an intermediate bearing for the shaft 19, one or more of which may be provided, said bearing consisting of a babbited sleeve which is supported by radial bolts 37, the outer ends of which are connected with the well-tube, as shown in Figs. 1 and 2. Said bearing, therefore, centers the shaft 19 in addition to supporting it against lateral strain.

38—39 indicate tubes, which connect with the upper and lower ends, respectively, of the bearing sleeve 36, the tube 38 extending up through the elbow 13 and being provided with a suitable cap 40. The latter tube serves to keep the dirty water from grinding or cutting the joints or bearings of the shaft 19. A stuffing-box 41 prevents the escape of water where said tube passes through said elbow. The lower end of the tube 39 extends down to the upper end of the cylinder 16, where it is connected with part of the water-elevating mechanism, as hereinafter described. In the drawings we have shown two sleeves 38—39, but a greater number may be employed, if desired, depending on the depth of the well,—it being understood that the shaft 19 is inclosed by said tubes which separate the upper portion thereof from the water in the well-tube 12.

The shaft 19 may be rotated by any suitable mechanism, as, for example, by means of power applied through pulleys 42, as shown in Fig. 1, or by a motor 43 mounted directly upon the upper end thereof, as shown in Fig. 4.

The interior construction of the cylinders 16 is best shown in Figs. 5 and 6, from which it will be seen that each cylinder is really in two parts, the upper part 16ª having a central sleeve 44 suitably babbited and forming a bearing for the pump shaft 19. Said sleeve is provided at its lower end with an outwardly-extending radial flange 45 which terminates a short distance from the inner face of the cylinder section, leaving a narrow annular space 46, shown in Figs. 5 and 6. Around the outer margin of the flange 45 there is provided a tapered sleeve 47, the smaller diameter of which is at the top, said sleeve being substantially

parallel with the inner face of the cylinder section so that an upwardly and inwardly inclined annular channel 48 is provided for the passage of water. In the annular passage 46 between the margin of the flange 45 and the inner surface of the cylinder section are a series of inclined blades 49 which are fixed to the inner face of the cylinder section and are arranged at short intervals, forming inclined passages through which the water rises to the passage 48 when forced violently outward against said blades 49, as hereinafter described.

16[b] indicates the lower member of the cylinder 16, which is fitted thereto, as shown in Fig. 5, and is shaped to provide a vertical passage which is in the shape of an hour-glass, the intermediate portion thereof being contracted, as shown at 50 in Fig. 5, the upper half of said section forming an inclined bottom 51 for the chamber which contains the blades 49. This tapered bottom coöperates with the turbine wheels, as will hereinafter appear. All the parts of the cylinder 16 are fixed or rigid.

52 indicates the pump runners or impellers, which act to throw the water outward against the inclined blades 49 which direct it upward through the pump cylinders and well-tube. Said runners, of which any number may be used, are placed in the cylinders 16, as shown in Fig. 1, being mounted upon and secured to the pump shaft 19 so as to rotate therewith. This is best secured by making the pump shaft in sections, the ends of adjoining sections being screwed into the hub 53 of the runner 52, as shown in Fig. 1, so that the hub serves as a coupling to unite the sections of the shaft and at the same time the runner is prevented from moving longitudinally upon the shaft.

Each of the runners, in the construction shown in Figs. 1 and 7 to 11, comprises the hub 53 and a series of downwardly-extending spiral blades 54 similar in some respects to the blades of a propeller, said blades being connected intermediately by an annular flange 55 which extends around the wheel a short distance from the upper ends of the blades 54, as shown in Fig. 11, being intersected by said blades, as illustrated in Fig. 9. As best shown in Figs. 1 and 11, the lower edges of the blades 54 are inclined to conform to the inclination of the upper inner face of the member 16[b] which serves to confine the water and facilitate the action of the blades 54 upon it: also to direct the water upward against the stationary blades 49 as it is forced outward and upward by the rotation of the runner. The tapered lower face of the member 16[b], as best shown at 56 in Figs. 1 and 5, directs the upwardly-flowing water toward the runner above it.

The water-elevating mechanism is lowered into the well until the lowermost runner at least is submerged when, by rotating the shaft 19, the runners act to force the water in which they are immersed outward and upward against the stationary blades 49, which, in turn, direct it upward to the space above the runner where it is subjected to the action of the next higher runner, if more than one is used. After passing the uppermost runner the water continues to rise until it is discharged through the outlet 13. For the purpose of lubricating the shaft bearings the lower end portion of the tube 39 is perforated, as shown at 57 in Fig. 1, the perforations being protected by a screen 58, or other suitable filtering medium, to prevent sand or other particles from entering the tube. When the pump is in operation, water from the discharge passage enters tube 39 through the screen and lubricates the shaft bearings above the perforations as well as below them, since the pressure in said tube is the same as that in the well-tube 12. When the pump is not in operation, the water settles back and flows out through the perforations in the tube 39 and through the screen 58, thereby cleansing the screen of any matter accumulated on it. Inasmuch as the perforations 57 and the screen 58 are practically at the lower end of the tube 39, when the pump is stopped all the water in said tube passes out.

As will be readily understood by those acquainted with the action of centrifugal pumps, water rising from the rotary water raising elements into the lower end of the well tube 12 has a rapid swirling or rotating movement, by reason of which the sand and sediment carried up by the water is forced by centrifugal force toward the outside away from the screen 58, whereby the purifying effect of the said screen is greatly enhanced.

In order to counteract the downward pressure upon the pump, we provided for admitting water to the cylinder 33 below the piston 35 by providing a conduit 59 in each of the pump cylinders, best shown in Figs. 1 and 5, said conduit being formed by registering passages in each of the several cylinder sections. The lowermost section 18 is also provided with a passage 60 which communicates with said conduit and with the cylinder 33 so that water is admitted through said conduit to said cylinder. The upper end of the conduit 59 opens into the upper portion of the uppermost cylinder 16 above the runner therein, as shown at 61 in Figs. 1 and 5, so that the pressure of the water in the well-tube 12 is communicated from below to the piston 39, thus creating a balance and relieving the shaft 19 with the pumping mechanism supported thereby from downward pressure. By making the bottom of the cylinder 33 conical and providing the

outlet 34 particles of sand or other matter carried by the water through the conduit 59 gravitate to the bottom of the cylinder and may escape through such opening, thereby avoiding danger of grinding which might occur in case of sand getting in between the cylinder 33 and piston 35. The cylinder 33 and piston 35 also inclose and protect the lower bearing 31.

From the foregoing description it will be seen that our improved pumping mechanism may be advantageously employed to elevate water which cannot be lifted by a suction pump placed at the surface, it being capable of efficient operation for elevating water from depths of hundreds of feet below the surface. By providing two anti-friction bearings, such as the ball bearing at the top from which the shaft is suspended and the water-step at the bottom, we provide not only for properly supporting the drive shaft at the commencement of the operation of the pump, but also during its operation. When the pump is first started, there being little water in the well, the weight of the shaft and parts carried thereby is supported from the ball bearing at the top, but as soon as the water being pumped reaches the uppermost cylinder a portion of it passes through conduit 59 to the cylinder 33 and begins to relieve the shaft of downward pressure, the upward pressure thus caused increasing with the height of the water in the well until the downward pressure is neutralized, as above stated. In operation of pumps of this character there is considerable wear between the runners and the coacting stationary portions of the cylinders in which they are mounted, and to maintain the efficiency of the pump, it is necessary to compensate for this wear. In our improved pumping apparatus this is accomplished by means of the adjusting plate or nut 26 which screws upon the head 27. By adjusting this nut, the pump-shaft 19 may be adjusted vertically so as to maintain the runners in the most effective relation to the cylinders in which they operate. The bearing 31 at the lower end of the pump-shaft permits of this adjustment and also prolongs the life of the pump by properly holding the lower end of the pump-shaft in position, and thereby preventing lateral displacement of the pump runners while in operation.

In Figs. 13, 14 and 15 we have illustrated one of our improved coupling devices for uniting the several sections of the well-tube or tubes and of the protecting tube or tubes and the devices for centering the pump shaft and the bearings therefor. As best shown in Figs. 13 and 14, 62 indicates a spider, the outer margin of which fits between the adjacent ends of adjoining sections of the well-tube 12, and is firmly clamped between them by a coupling sleeve 63 which draws the sections of the well-tube together, as shown in Fig. 13. The spider 62 is provided with a central sleeve 63^a, the upper and lower ends of which are externally screw-threaded to receive the adjacent ends of the tubes 38—39. Thus the sleeve 63^a serves to center the tubes 38—39 and hold them properly in position. This is further secured by providing the spider 62 with depending webs 64, as shown in Figs. 13 and 15. The sleeve 63^a forms a bearing for the pump-shaft 19, which passes through it and is provided with a sleeve 65 which bears in the sleeve 63^a, the latter being provided with a lining 66 of Babbitt metal or other suitable anti-friction material. The sleeve 65 is fixedly secured to the pump-shaft 19 by a rivet 67, or other suitable means, as shown in Fig. 13. Thus the wear is taken by the sleeve 65 instead of by the shaft, and the several parts are properly centered and held in position so that they cannot get out of alinement.

In Figs. 17, 18 and 19 we have shown a modified construction for the same purpose. In the construction therein shown we employ a spider 68 similar in many respects to the spider 62 since it has a central sleeve 60, which is screw-threaded and serves to unite the tubes 38—39 in the manner already described. It also is provided with a babbitted bearing 70, in which the pump-shaft 19 bears, and the latter is provided with the sleeve 65 in the same way as shown in Fig. 13. The spider 68, however, is of greater diameter than the well-tube 12 so that its margin projects beyond the outer surface of the well-tube and is engaged by coupling-rings 71—72 which are screwed, respectively, upon the lower end of the upper section and the upper end of the lower section of the well-tube, as shown in Fig. 17, and thus bear against the opposite faces of the projecting portion of the spider 18. The two rings 71—72 and the spider are all connected together by bolts 73 which pass through them, as shown in Fig. 17, thus firmly securing together the sections of the well-tube.

In Fig. 19 we have shown a modified arrangement of the driving mechanism for operating the pump and the mechanism for supporting and controlling the position of the pump-shaft. In the construction therein shown, 74 indicates a standard having laterally-projecting lugs 75, on which rests a casting 76 which carries certain devices for supporting and lubricating the pump-shaft 19. At the top of said casting 76 is provided a box 77 in which is placed a ball-bearing 78. Above said ball-bearing is a plate or disk 79 which is secured to the upper end of the shaft 19 so that it assists in supporting the weight of the shaft and transmits the same to the ball-bearing 78.

80 indicates a similar ball-bearing in the lower portion of the casting 76 which rests upon a sleeve or plate 81 which is also secured to the shaft 19 and transmits to the ball-bearing 80 the upward thrust of said shaft.

82 indicates an oil-chamber in the lower portion of the casting 76 and communicating by a duct 83 with the interior of the bearing-box 77.

84 indicates a return duct leading from the box 77 to the chamber 82.

85 indicates a wheel or disk secured to the plate 81 in the chamber 82 so that it rotates with the shaft 19 and serves by its rotation to force oil from the chamber 82 up through the duct 83 to the bearing-box 77 thereby lubricating the bearing 78 therein. The oil thus forced up to the box 77 returns through the duct 84 to the chamber 82 and thus is caused to circulate continuously as the pump-shaft 19 rotates. By this arrangement both ball bearings are constantly kept lubricated.

To further assist in supporting the pump-shaft and to regulate the point at which it works, we provide a water-governor comprising a piston 86 which is secured to the shaft 19 in any suitable way, as by set-screws 86' within a chamber 87 located a short distance above the outlet-pipe 13. Said piston 86 overlies a water-chamber 88 with which communicates a passage 89 supplied through a pipe 90 with water under pressure. The arrangement is such that water admitted through the pipe 90 presses upward on the piston 86. Should the pressure of the water admitted increase above the normal the pressure on the piston 86 will raise the pump-shaft, thereby carrying said piston out of contact with the walls of the chamber 88 and permitting the water to escape into the chamber 87 through passages 91 and thence escape through an escape-pipe 92, which communicates with said chamber 87, as shown in Fig. 12. By this construction the pump-shaft rotates on a film of water, which further relieves it from friction and improves its operation.

93 indicates a motor for driving the shaft 19, said motor being mounted on top of the standard 74 and being connected with the shaft 19 by a flexible connection which insures the proper operation of the shaft even though it should get somewhat out of alinement with the motor.

As shown in Fig. 12, 94 indicates the motor-shaft which carries at its lower end a coupling-member 95 which engages a corresponding coupling-member 96 carried at the upper end of the pump-shaft 19. The coupling-member 95 carries a series of downwardly-projecting pins 97 which engage teeth 98 carried by the coupling-member 96, so that the coupling-members interlock and insure the driving of the pump-shaft by the motor.

99 indicates a pipe which communicates with the tube 38 and is used to admit water to the tube 38 to wet the shaft bearings and lubricate them before starting the pump.

In Figs. 16, and 20 to 23 we have shown a modified arrangement of the runners. In the construction shown in said figures, 100—101 indicate the upper and lower members of the pump cylinder section, the upper member being provided with inclined blades or vanes 102, which are substantially the same as the blades 49 shown in Fig. 5. Arranged centrally in the upper section 100 and forming a bearing for the pump-shaft is a sleeve 103 having a lining 104 of Babbitt metal, or other suitable material. The sleeve 103 corresponds with the sleeve 44 and is externally screw-threaded to receive the tube 38 or 39, as the case may be. 105 indicates the runner, which is in many respects similar to the runner 52, and being provided with blades 106 which direct the water outward and upward against the blades 102, thereby causing it to rise through the cylinder. The wheel 105 is adapted to be secured to the pump-shaft in the manner already described, but the construction shown in Figs. 16 to 23 differs from the construction shown in the earlier figures principally in that bearings are provided for the runner above and below the blades 106. As shown in Fig. 20, the runner 105 is provided with an upwardly-projecting annular flange 107 above the blades 106, which has a bearing in the lower end of a conical shell 108 which extends down from the sleeve 103, as shown in Fig. 20. In like manner, at its lower end the runner is provided with a downwardly-projecting flange 109 which has a bearing in an inwardly-projecting portion 110 of the lower member 101 of the pump cylinder, as also shown in Fig. 20. Both the flanges 107 and 109 are provided with grooves 111 forming water-packings so as to permit the runner to move up and down freely without loss of water. The advantage of this construction is that when pumping hard the twist upon the pump-shaft has a tendency to shorten the shaft, but when the strain is off the shaft is again elongated to its normal length. This lengthening and shortening of the shaft necessarily raises and lowers the several runners which are connected with it, and consequently it is necessary to provide for such movement of the runner. Also there is more or less tendency for the runners to rise and fall in normal pumping.

That which we claim as our invention, and desire to secure by Letters Patent, is,—

1. In a pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in

said cylinder, means carried by said shaft for elevating the water in the cylinder, a piston at the lower end of said shaft, and a second cylinder in which said piston moves, said first-mentioned cylinder having a passage for admitting water from the pump to said second cylinder below said piston.

2. In a pump, the combination of a well tube, a rotary shaft extending longitudinally therein, a plurality of pump cylinders communicating respectively with one another and with said well-tube, coöperating devices carried by said shaft and said cylinders for forcing the water upward into the well-tube, a piston at the lower end of said shaft, a cylinder in which said piston moves, and means for admitting water from the pump to the latter cylinder.

3. In a pump, the combination of a well-tube, a rotary shaft extending longitudinally therein, a plurality of pump cylinders communicating respectively with one another and with said well-tube, coöperating devices carried by said shaft and said cylinders for forcing the water upward into the well-tube, a piston at the lower end of said shaft, a cylinder in which said piston moves, means for admitting water from the pump to the latter cylinder, and means at the upper end portion of said shaft for suspending the same.

4. In a deep-well pump, the combination of a well-tube, a cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, means at the upper end portion of said shaft for suspending the same, a piston at the lower end of said shaft, a second cylinder in which said piston moves, said first-mentioned cylinder having a passage for admitting water from the pump to said second cylinder, and an opening in the bottom of said second cylinder.

5. In a pump, the combination of a well-tube, a sectional cylinder communicating therewith, a rotary shaft extending longitudinally in said cylinder, a sleeve in said well-tube surrounding said shaft, means carried by said shaft for elevating the water in the cylinder, a bearing for the lower end of said shaft, and a duct formed integral with the cylinder sections and extending from above said water-elevating means to said bearing.

6. In a pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for the pump-shaft below the lowermost runner for centering the shaft, and means substantially inclosing said bearing for protecting the same.

7. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing for the pump-shaft below the lowermost runner, and means inclosing and protecting said bearing, said protecting means having an opening at the bottom for the escape of sand.

8. In a vertical pump of the type described, the combination of a pump-shaft, one or more runners carried thereby, a bearing above the uppermost runner, a tube surrounding the pump-shaft above the uppermost runner, said tube having one or more perforations to admit water to said upper bearing, and means for straining the water passing through said perforation or perforations.

9. In a vertical pump of the type described, the combination of a well-tube forming a water-discharge passage, a pump-shaft in said well-tube, one or more runners carried thereby, a bearing for said shaft, a tube surrounding the pump-shaft adjacent to said bearing, said tube having one or more perforations to admit water to said bearing, and means for straining the water passing through said perforation or perforations.

10. In a vertical pump of the type described, the combination of a well-tube forming a water-discharge passage, a pump-shaft in said well-tube, one or more runners carried thereby, a bearing for said shaft, a tube surrounding the pump-shaft adjacent to said bearing, said tube having one or more perforations to admit water to said bearing, and means for straining the water passing through said perforation or perforations, said straining means being in said water-discharge passage.

11. In a vertical pump of the type described, the combination of a well-tube forming a water-discharge passage, a pump-shaft in said well-tube, one or more runners carried thereby, a bearing for said shaft, a tube surrounding the pump-shaft adjacent to said bearing, said tube having one or more perforations to admit water to said bearing, and means adjacent to the lower end of said tube for straining the water passing through said perforation or perforations.

12. The combination with the pump casing, the impeller therein, a shaft bearing carried by the pump casing, a line shaft passing through said bearing and carrying said impelier, a pump head, means forming a water conduit and for suspending said pump casing from said pump head, a head bearing member through which said line shaft projects, said head bearing member being mounted on said pump head, a driving pulley on said line shaft, a line shaft casing extending from the pump casing to the pump head and means for effecting a circulation of clear well water from the water conduit through said line shaft casing.

13. In a centrifugal pumping apparatus the following elements in combination, a

centrifugal pump, a line shaft for the pump, a discharge duct from the pump to the top of the well through which said shaft passes, a shaft casing for closing said shaft off from the rising column of water in said discharge duct, and means for effecting a circulation of well water inside such shaft casing.

14. The combination of a well casing, a rotary pump therein, a pump shaft, a casing inclosing said shaft from the rising column of water in the well, means for freeing a portion of the rising column of well water from sand and detritus and passing the water so freed into said shaft casing.

15. In a well mechanism, in combination with a rotary pump, a pump shaft, a casing surrounding the shaft from the pump to the top of the well, to protect said shaft from the rising column of well water, and means for purifying a portion of said well water and delivering it into the shaft casing.

16. In a pumping apparatus having a water discharge passage, the combination of a shaft rotatable in said passage, a bearing for said shaft separated from said water discharge passage, and a screen covering a port between said shaft and said water discharge passage adapted to filter water permitted to pass to said bearing for lubricating purposes.

17. In a pumping apparatus, the combination of a water discharge casing, a shaft extending therethrough, a shaft casing located in said water discharge casing separating said shaft therefrom, means for rotating said shaft, means operatively connected with said shaft for forcing water upward through said water discharge casing, a bearing for said shaft in said shaft casing, and a screen covering a port in the wall of said shaft casing below the level of the water about said shaft casing during the pumping operation, said screen being adapted to filter water permitted to pass into said shaft casing for the purpose of lubricating said bearing.

18. The combination of a well casing, a pump shaft therein, a casing inclosing said shaft from the rising column of water in the well, means for rotating said shaft, and means actuated by the rotation of said shaft for forcing water upward through said well casing and for giving the water a swirling movement as it passes the lower end of said shaft casing whereby the sand or other sediment carried by the water is directed by centrifugal force away from said shaft casing at its lower end, said shaft casing having a port leading thereinto near its lower end for admitting water thereto.

19. The combination of a well casing, a pump shaft therein, a casing inclosing said shaft from the rising column of water in the well, means for rotating said shaft, means actuated by the rotation of said shaft for forcing water upward through said well casing and for giving the water a swirling movement as it passes the lower end of said shaft casing whereby the sand or other sediment carried by the water is directed by centrifugal force away from said shaft casing at its lower end, said shaft casing having a port leading thereinto near its lower end for admitting water thereto, and means for straining the water entering said shaft casing.

20. The combination of a well casing, a pump shaft therein, a casing inclosing said shaft from a rising column of water in the well, means for rotating said shaft, said shaft casing having a port leading thereinto for admitting water thereto, and means actuated by the rotation of said shaft for forcing water upward through said well casing and for giving the rising water a swirling movement as it passes said port whereby the sand or other sediment carried by the water is directed by centrifugal force away from said port.

21. In a pumping apparatus, the combination of a water discharge casing, a shaft extending therethrough, a shaft casing located in said water discharge casing separating said shaft therefrom, means for rotating said shaft, means operatively connected with said shaft for forcing water upward through said water discharge casing, and means for purifying a portion of the water pumped and delivering it into said shaft casing near its lower end adapted to discharge the water from the shaft casing upon the cessation of the operation of the pump.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN

Witnesses:
HARRY WILLIAM SPILLER,
B. L. PALMER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ing and sealing, will require about four weeks, and such work will not be undertaken until after payment of the necessary fee.

When you send the final fee you will also send, distinctly and plainly written, the name of the inventor, title of invention, and serial number as above given, date of allowance (which is the date of this circular), date of filing, and, if assigned, the names of the assignees.

If you desire to have the patent issue to assignees, an assignment containing a request to that effect, together with the fee for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of five cents each. The money should accompany the order. Postage stamps will not be received.

Final fees will not be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

Respectfully,

THOMAS EWING,
Commissioner of Patents.

Adams and Jackson, 1147 Monadnock Bldg., Chicago, Ill.

145 [On left margin:] In remitting the final fee give the serial number at the head of this notice.

[On right margin:] Uncertified checks will not be accepted.

2–327.

$20, c'k. Recd. Jul- 12, 1915. D. C. C., U. S. Pat. Office.

Memorandum of Fee Paid at United States Patent Office.

(Be careful to give correct Serial No.)

Serial No. 482,517.

—— —, 190–.

Inventors: Chapman & Chapman.
Patent to be issued to Assignee of record.
Name of invention: Deep well pump.
Date of payment: July 10, 1915.
Final fee: $20.00.
Date of Filing: March 10, 1909.
Date of circular of allowance: June 30, 1915.

ADAMS & JACKSON,
Solicitors.

Send patent to Adams & Jackson, 1147 Monadnock Building, Chicago, Ill.

(Here follow diagrams and specification marked p. 146 to 160, incl.)

161

2–421.

Division 9.

1909.

Contents.

½. Print, ——.
1. Application, O. K. papers.
2. Rej., May 4, 1909.
3. Amendt. *A*, Apr. 29, 1910.
4. Rejection, June 4, 1910.
5. Letter of appearance, Sept. 30, 1910.
6. Amendt. *B*, Apr. 24, 1911.
7. Rejection, May 11, 1911.
8. Amendt. *C*, Apl. 10, 1912.
9. Rej., May 10, 1912.
10. Substitute power, July 13, 1912.
11. Amendt. *D*, Apl. 30, 1913.
12. Rej., May 29, 1913.
13. Amendt. *E*, May 18, 1914.
14. Amendt. *F*, May 25, 1914.
15. Rej., June 27, 1914.
16. Amendt. *G*, Jan. 12, 1915.
17. Fin. rej., Jan. 20, 1915.
18. Letter and print, Jan. 12, 1915.
19. Print, Jan. 26, 1915.
20. Brief, ——.
21. Interference, Feb. 2, 1915.
22. Letter, May 25, 1915.
23. Amendt. *H*, June 24, 1915.
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162 Class 103—Pumps, Rotary Single Piston.
Title: Deep Well Pump.
(21 claims.)
Class 103/43.

[Endorsed:] 157,351/17.

[Endorsed:] No. 1132. John A. Wintroath, appellant, vs. Matthew T. Chapman et al. Return to Writ of Certiorari. Court of Appeals, District of Columbia. Filed Nov. 2, 1917. Henry W. Hodges, clerk.

163 WEDNESDAY, January 16th, A. D. 1918.

* * * * * * *

No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

The argument in the above entitled cause was commenced by Mr. H. L. Lechner, attorney for the appellant, and was continued by Mr. J. L. Jackson, attorney for the appellees, and was concluded by Mr. Paul Synnestvedt, attorney for the appellant.

164 In the Court of Appeals of the District of Columbia.

Patent Appeal No. 1132.

JOHN A. WINTROATH, Appellant.

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

Opinion.

Mr. Chief Justice SMYTH delivered the opinion of the Court.

This is an appeal from the decision of the Commissioner of Patents in an interference case. Appellant obtained his patent in 1913. In 1909 appellees filed an application for a patent which disclosed the invention of the issue but did not claim it. On July 6, 1915, 20 months after the granting of the Wintroath patent, and more than 6 years after the filing of their parent application, the appellees filed a divisional application embracing the claims of the issue. An interference having been declared, appellant asserted that because appellees were remiss in making their claims, they were barred.

In support of this, appellant points to our decision in Rowntree v. Sloan, 45 App. D. C. 207, where it was held that, in analogy to the time allowed by the Statute for amendments to applications (R. S. Sec. 4894), a failure for more than one year to make a divisional application amounted to laches and barred its allowance. The Commissioner refused to follow the decision on that point, saying it was obiter and ruling that in his judgment the time should be two years instead of one, on the analogy of the Statute which gives an inventor that length of time after a patent has emerged to another for his invention before it is necessary for him to file his own application (R. S. Sec. 4886). He therefore decided that the appellees were not chargeable with laches and awarded them priority.

We do not think the decision in the Rowntree case on the point referred to is obiter. The delay in that case was for 36 months. It was necessary to decide whether or not it constituted laches
165 and in doing so it was proper to indicate the limit—one year—beyond which delay would amount to laches.

Nor do we believe that the two year rather than the one year period should prevail. True, there is some resemblance between the divisional application of the Chapmans and an application of an inventor whose invention has been patented to another, but it is not as intimate as that which exists between their application and one for leave to amend. Their application, if granted, would be in the nature of an amendment to their parent application and would date back to it (Lotz v. Kenney, 31 App. D. C. 205), while there is no element of an amendment in the application of an inventor under the two year Statute. In the one case there is something to amend, in the other nothing. We therefore adhere to the ruling in the Rowntree case, but with this modification however:—the period should be one year unless the applicant shall satisfy the Commissioner that the delay was unavoidable. This brings the holding into closer harmony with the Statute governing amendments (R. S. sec. 4894) than is done by the Rowntree case.

Appellees assert that, however this may be, we have no right to consider laches in an interference proceeding, and they cite a number of decisions of this court to the effect that our jurisdiction in such proceedings "is confined to a determination of the question of priority." Undoubtedly that is the law. But, what is meant by priority? Does it mean priority of conception; or of reduction to practice with diligence; or reduction to practice without diligence; or all of these things and more? In determining the question of priority we have considered which party procured from the other the idea of the invention (Milton v. Kingsley, 7 App. D. C. 531); whether there had been a reduction to practice (Stevens v. Seher, 11 App. D. C. 245); lack of reasonable diligence (Paul v. Johnson, 23 App. D. C. 187; Wickers v. McKee, 29 App. D. C. 4); concealment (Metthes v. Burt, 24 App. D. C. 265); existence of reasonable diligence (Yates v. Huson, 8 App. D. C. 93); the effect of constructive reduction to practice (Sherwood v. Drewson, 29 App. D. C.
166 161); that one party was the agent of another (Milton v. Kingsley, 7 App. D. C. 531; Heuvel v. Bernard, 15 App.

D. C. 510); and the right of a party to make the claims of the issue (Podlesak v. McInnerney, 26 App. D. C. 399; Wickers v. McKee, 29 App. D. C. 4). Priority in an interference proceeding is the ultimate question for determination, but before it can be reached it may be, and usually is, necessary to decide one or more incidental or ancillary questions, as is shown by the decisions just referred to and others which might be cited.

It is argued that, because we have also held that in an interference proceeding we would not decide whether there existed a statutory bar to the granting of a patent to the successful party, or whether either of the parties to the interference would ultimately have the right to a patent, we should not, if we follow the doctrine of those decisions, consider laches in this case. This does not follow. There is a clear distinction between those questions and laches as it arises in this case. It relates to a different purpose.

The dispute in an interference case is in respect to which one of the disputants is entitled to priority concerning a given alleged invention. (Foster v. Antisdel, 14 App. D. C. 552, 555; Prindle v. Brown, 24 App. D. C. 114). Let us suppose that A and B are the contestants. If it be held that as between them A conceived and reduced the invention to practice in 1915 but that B never thought of it until 1916, it would profit B nothing to show that A could not secure a patent for the invention, either because it was not patentable, or his right to a patent was barred by the statute of public use, or for any other reason. Therefore such a showing would be immaterial. These infirmities in A's situation would present questions between him and the Patent Office, in which B as an applicant would have no interest whatever. They would arise in a proceeding different from an interference proceeding, and one in which the parties were not the same. Consequently our holdings that the bar of the statute of public use, lack of patentability and similar questions are not justiciable in an interference proceeding, is in no way
167 inconsistent with the holding that laches is.

There is nothing in the record to show that the Chapman's delay in presenting their application was unavoidable.

In view of what has been heretofore said, the decision of the Commissioner is reversed, and priority as to all the claims of the issue is awarded to John A. Wintroath.

Reversed.

168 MONDAY, March 4th, A. D. 1918.

* * * * * * * *

No. 1132. January Term, 1918.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

Subject Matter: Deep Well Pumps. Interference No. 39,684.

Appeal from the Commissioner of Patents.

This cause came on to be heard on the transcript of the record from the Commissioner of Patents and was argued by counsel. On consideration whereof, It is now here ordered and adjudged by this Court that the decision of the said Commissioner of Patents in this cause be and the same is hereby reversed, and priority as to all the claims of the issue is awarded to John A. Wintroath.

Per Mr. CHIEF JUSTICE SMYTH.

March 4, 1918.

169 Court of Appeals of the District of Columbia, October Term, A. D. 1917.

Patent Appeal No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

Petition for Rehearing.

The petition of Matthew T. Chapman and Mark C. Chapman, appellees in the above entitled cause, respectfully represents to this Honorable Court:

1. That the opinion of the court shows that the decision reached was based on a misunderstanding of a very material fact, to-wit, the undisputed fact that Wintroath never thought of the invention until on or about the first day of October, 1910, which was a year and a half later than Chapman & Chapman's constructive reduction to practice of the invention by filing their application for patent therefor on March 10, 1909. The facts of this case are on all fours with those of the supposititious case suggested in the opinion as an example of one where this court on appeal in an interference case would have no jurisdiction to consider an objection made by the
170 junior party to the grant of a patent to the undisputed prior inventor. The court's own illustration, therefore, absolutely

sustains appellees' contention that Wintroath having admitted Chapman & Chapman's actual priority, the court had no jurisdiction to consider on this appeal any reasons that might exist why a patent should not be granted to appellees for the subject-matter of the issue.

2. In the opinion filed the court modifies the ruling in the case of Rowntree v. Sloan, as follows:

"the period should be one year unless the applicant shall satisfy the Commissioner that the delay was unavoidable."

Nevertheless, and notwithstanding this modification of its former ruling, the court applies the former ruling in this case, and decides against appellees without giving them the opportunity to satisfy the Commissioner, if they can, that the delay was unavoidable. Appellees have not had their day in court on that proposition, and they have had no opportunity to take any testimony or to present any reasons to the Commissioner or to anyone else why the claims of the issue were not introduced into their original application at an earlier date. No such reasons have ever been required of them. The Examiner of Interferences and the Board of Examiners-in-Chief both held themselves bound by the original ruling in the Rowntree-Sloan case, which did not permit any explanation or excuses for delay beyond one year. If that ruling was wrong in that respect, as the court now holds, the judgments rendered pursuant to that ruling were wrong, and it is a denial of justice to deny to appellees the right to excuse their delay. (See Carlin v. Goldberg, 136 O. G., 1222.)

3. The court in considering the question of whether the two-year rather than the one-year period should prevail, overlooked
171 the vital distinction between abandonment or forfeiture of an application and abandonment or forfeiture of an invention. In the whole law of patents there is no rule by which an inventor is deprived of his invention by presumptive abandonment arising through negligence or delay short of two years, but his application may become abandoned by inaction for one year. In the latter case, however, he may file a new application if the two-year bar has not arisen in the meantime and the invention has not been abandoned, or the abandoned application may be revived on a proper showing to the Commissioner. The rule announced in the opinion however, works an absolute forfeiture of the invention after one year, and is, therefore, far more drastic than the laws deliberately enacted by Congress to govern such cases. It has no justification in the law, and clearly is judicial legislation.

4. The opinion is obscure in the reference to appellees' application as "one for leave to amend." Appellees are not here asking for leave to amend an application. Their divisional application was regularly filed pursuant to a requirement for division, and as filed contained the claims of the issue. Under the law as it has been settled for the past fifty years, that application relates back to and is entitled to the same date as the parent application (Lotz v. Kenny,

31 App. D. C., 205). It is not an amendment of the parent application, but is a continuation of it, and was filed in response to a requirement of the Patent Office that the claims in the parent application be limited to one structure. (See official letter of June 27, 1914, Return to Writ of Certiorari, page 42.)

5. In the opinion it is said that "appellees assert that * * * we have no right to consider laches in an interference pro-
172 ceeding." The court has entirely misapprehended appellees' contention in that regard. What appellees contended was and is that the question of laches, as presented by the facts of the case at bar, is purely an ex parte one, as it has nothing whatever to do with the question of priority as between Chapman & Chapman and Wintroath, which is settled beyond all controversy by the official records of the Patent Office. (Appellees' brief, page 14.) This contention is completely sustained by the supposititious case cited by the court and its comments thereon, and the fact that the court notwithstanding decided adversely to appellees is a demonstration that the facts of this case were misunderstood by the court. This is further shown by the discussion in the opinion of what is meant by priority of invention. Laches, where it affects priority, is pertinent, but in the case at bar laches has nothing to do with priority, because Wintroath does not claim to have thought of the invention until long after Chapman & Chapman had conceived, reduced to practice, and filed their application for patent for it.

6. The ruling of the court in this case is in direct conflict with the decision of the Supreme Court of the United States in U. S. v. American Bell Telephone Co. et al., 167 U. S., 224, in which the court held that an applicant for patent prosecuting his application in accordance with the provisions of the statutes is entitled to avail himself of the delays which the law allows, and holds that—

"the statute has given this right and no consideration of the public benefit can take it from him. * * * No court can disregard any statutory provisions in respect to these matters on the ground that in its judgment they are unwise or prejudicial to the interests of the public."

However worthy may have been the motive of this court in announcing the ruling in Rowntree v. Sloan, that ruling, if ap-
173 plied to a case such as this, where the patentee does not claim conception until after the applicant's filing date, and there is no controversy as to the identity of the subject-matter of the issue, has no basis in the statutes. On the contrary, it is directly in conflict with the statutes and with the ruling of the Supreme Court in the Bell Telephone case above cited, and in fact, is judicial legislation, and, therefore, unconstitutional. Moreover, it is unfair and inequitable, because it is retroactive, and deprives applicants who may be prosecuting their applications for patent according to the laws and practice as they have existed for generations, of rights which they have under the statutes, and absolutely bars the granting of patents under conditions which fully meet the requirements of the

patent statutes. Even Congress in legislating regarding the rights of inventors is careful to safeguard the interests of applicants having pending applications and does not enact laws which deprive applicants, without notice, of rights theretofore possessed by them. Much less should the courts do so, even if they possessed the power.

Wherefore your petitioners pray this Honorable Court for a rehearing of the above entitled cause.

MATTHEW T. CHAPMAN,
MARK C. CHAPMAN,
By ADAMS & JACKSON,
Their Attorneys.

I hereby certify that I am of counsel for the above named petitioners, and that in my judgment the above petition is well founded in law and ought to be granted.

JOHN L. JACKSON,
Counsel for Petitioners.

Chicago, March, 1918.

(Endorsed:) No. 1132, Patent Appeal Docket. John A. Wintroath, Appellant, v. Matthew T. Chapman et al. Petition for rehearing. Court of Appeals, District of Columbia. Filed Mar. 16, 1918. Henry W. Hodges, Clerk.

174 SATURDAY, March 23rd, A. D. 1918.

* * * * * * *

No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN et al.

In consideration of the petition for a rehearing in the above entitled cause, It is by the Court this day ordered that said motion be and the same is hereby denied.

175 Court of Appeals of the District of Columbia.

I, Henry W. Hodges, Clerk of the Court of Appeals of the District of Columbia, do hereby certify that the foregoing printed and typewritten pages numbered from 1 to 174 inclusive, constitute a true copy of the transcript of record and proceedings of said Court of Appeals in the case of John A. Wintroath, Appellant, vs. Matthew T. Chapman, and Mark C. Chapman. No. 1132, Patent Appeal Docket, April Term, 1918, as the same remain upon the files and records of said Court of Appeals.

In testimony whereof I hereunto subscribe my name and affix the seal of said Court of Appeals, at the City of Washington, this 8th day of April, A. D. 1918.

[Seal of the Court of Appeals of the District of Columbia.]

HENRY W. HODGES,
Clerk of the Court of Appeals of the District of Columbia.

176 UNITED STATES OF AMERICA, *ss:*

The President of the United States of America, To the Honorable the Judges of the Court of Appeals of the District of Columbia, Greeting:

[Seal of the Supreme Court of the United States.]

Being informed that there is now pending before you a suit in which John A. Wintroath is appellant, and Matthew T. Chapman and Mark C. Chapman are appellees, No. 1132, Patent Appeal Docket, which suit was removed into the said Court of Appeals by virtue of an appeal from the Commissioner of Patents, and we, being willing for certain reasons that the said cause and the record and proceedings therein should be certified by the said Court of Appeals and removed into the Supreme Court of the United
177 States Do hereby command you that you send without delay to the said Supreme Court, as aforesaid, the record and proceedings in said cause, so that the said Supreme Court may act thereon as of right and according to law ought to be done.

Witness the Honorable Edward D. White, Chief Justice of the United States, the sixteenth day of June, in the year of our Lord one thousand nine hundred and eighteen.

JAMES D. MAHER,
Clerk of the Supreme Court of the United States.

178 [Endorsed:] File No. 26,528. Supreme Court of the United States, No. 1061, October Term, 1917. Matthew T. Chapman et al. vs. John A. Wintroath. Writ of Certiorari. Court of Appeals District of Columbia. Filed Jun. 26, 1918. Henry W. Hodges, Clerk.

179 In the Court of Appeals of the District of Columbia. October Term 1917.

Patent Appeal Docket, No. 1132.

JOHN A. WINTROATH, Appellant,

vs.

MATTHEW T. CHAPMAN and MARK C. CHAPMAN.

It is stipulated by Counsel for the parties to the above entitled cause that the certified transcript of record in said cause heretofore filed in the Supreme Court of the United States in connection with the application of said Matthew T. Chapman and Mark C. Chapman for a Writ of Certiorari directed to the Court of Appeals of the District of Columbia, which application was on the 10th day of June, 1918, granted by the Supreme Court, can be taken as a return to said writ.

PAUL SYNNESTVEDT,
HARVEY L. LECHNER,
Counsel for Appellant.
JOHN L. JACKSON,
Counsel for Appellees.

[Endorsed:] No. 1132, Patent Appeal Docket. John A. Wintroath, Appellant, vs. M. T. Chapman and M. C. Chapman. Stipulation. Court of Appeals, District of Columbia. Filed Jun. 26, 1918. Henry W. Hodges, Clerk.

I, Henry W. Hodges, Clerk of the Court of Appeals of the District of Columbia, do hereby certify, in obedience to the writ of certiorari hereto attached and returned herewith, the foregoing to be a true and correct copy of the stipulation of counsel filed in said cause on the 26th day of June, A. D. 1918.

In Testimony Whereof, I hereunto subscribe my name and affix the seal of said Court at the City of Washington, District of Columbia, this 26th day of June, A. D. 1918.

[Seal of the Court of Appeals of the District of Columbia.]

HENRY W. HODGES, *Clerk.*

180 [Endorsed:] File No. 26,528. Supreme Court U. S. October Term, 1918. Term No. 456. Matthew T. Chapman, et al., Petitioners, vs. John A. Wintroath. Writ of certiorari and return. Filed June 26, 1918.